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Gamification in education – practical solutions for educational courses

Abstract

Gamification can be defined as the use of game design elements in non-game contexts. The aim of this article is to present practical solutions for a gamified educational course. The solutions are based on mechanisms used in online games and on the results of empirical research on motivation. The first part of the article analyzes theories of intrinsic and extrinsic motivation. The second part discusses the motivational aspects of one of the most popular games (World of Warcraft). The final part presents a detailed sample project for a gamified educational course. It proposes that – among classical solutions – a monetary schedule of reinforcement as well as a number of features based on the natural needs to cooperate and compete be included.

Keywords

gamification, intrinsic motivation, extrinsic motivation, MMORPG, e-learning

Streszczenie

Gamifikacja oznacza wykorzystanie elementów gier w kontekstach niezwiązanych z grami. Celem artykułu jest przedstawienie projektu zgamifikowanego programu edukacyjnego. Projekt ten opiera się na mechanizmach wykorzystywanych w grach online oraz na wynikach badań empirycznych dotyczących kształtowania motywacji. W pierwszej części artykułu zaprezentowane są teorie dotyczące motywacji wewnętrznej oraz zewnętrznej. W dalszej części przedstawione są mechanizmy wykorzystywane w grze World of Warcraft ze szczególnym akcentem położonym na ich funkcję motywacyjną. Artykuł kończy rozbudowany projekt zgamifikowanego programu edukacyjnego, uwzględniający zarówno elementy gry jak i specyfikę sytuacji edukacyjnej. Proponowane jest – obok klasycznych rozwiązań – wprowadzenie stałego rozkładu wzmocnień w postaci nagród pieniężnych oraz szeregu mechanizmów wykorzystujących naturalną potrzebę rywalizacji i współpracy pomiędzy graczami (uczniami).

Słowa kluczowe

gamifikacja, motywacja wewnętrzna, motywacja zewnętrzna, MMORPG; e-learning

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Introduction

Gamification can be defined as the use of game design elements in non-game contexts (Deterding, 2011). On the one hand, it is based on the implementation of game mechanics – using achievement badges, points, levels, individual or group missions, and rankings. On the other hand, it utilizes game ‘thinking’ – the user of a gamified program should experience his or her activity as a kind of play and not a duty, should be fully engaged and immersed. Although some game elements have long been used (frequent-flyer and other loyalty programs), only the publication of the book by Reeves and Reed (2009) started the purposeful and planned application of game rules in all possible contexts. We have gamified business (DevHub, Fango mobile application), health (Fitocracy), household chores (Chore Wars), city traffic (the Speed Camera Lottery in Sweden), devices and interfaces (Eco Score in Toyota Prius), scientific and marketing research (Foldit, Brand Bang!). Even prominent personalities from thematically distant fields emphasize the role of games: ‘Games are the new normal’ (Al Gore at the Games for Change Festival, 2011). Critics of the phenomenon note however that gamification is often reduced to mere pointsification (Robertson, 2010) – achieving levels and rewarding in various scoring systems, which in the end leads to undermining intrinsic motivation and ultimately reducing interest in an activity (Nicholson, 2012). For example, after a gamification experience, customer service staff may start to treat customers instrumentally – solely as means to gain points, and students who have gained levels for analyzing problems may never again return to the discussed issues. The aim of the current article is a theoretical analysis of gamification in the educational context in light of research on intrinsic and extrinsic motivation as well as an attempt to answer the question if the only acceptable alternative to boredom and discouragement is intrinsic engagement. Proposed solutions are presented in the form of a gamified social psychology course.

Gamified Education – Examples

Gamified education examples range from multi-course across-the-board immersive programs, through narrow single-course application of basic game elements, to use of playful features enhancing engagement and enjoyment.

Multi-course programs and complex layers to single courses

The first category includes Just Press Play which is a result of a collaboration between Rochester Institute of Technology (RIT) and Microsoft (Microsoft, without date). The program started in 2011 when 750 students of school of Interactive Games and Media began their quests in the narrative game which used the real world as a gaming platform

(narrative aims: reveal the secret history of RIT, overcome conflict between individual and group, art and technology). The players freely chose paths they would follow in their tasks. The paths were based on a combination of Explore/Master and I/We factors and encouraged pro-academic and pro-social behaviors. For example, a collective work on a 3D game engine would be a Master/We quest. Apart from narrative and structure features, Just Press Play included also standard game elements: achievements (e.g. Pulp Fiction – “Check out the book from the recreational reading section of Wallace Library”), challenges (e.g. coding duel), badges, likes and rankings. Additionally, special electronic keychains carried by students enabled recording and monitoring where, when and with whom every player was spending time.

Similar concept was developed by Joey J. Lee. His Scholar’s Quest aimed at helping graduate students succeed academically and socially (Lee, 2014, Noer, 2011). His game-based program included such elements as battling (in-class challenges), crafting (writing a paper), completing quests (making projects), customization (choosing a game/learning track), badges (different cards for different tasks) or final “boss level” (final game design project).

Single-course application of basic game elements

The second category includes application of simple game design to single courses. The design can be universal (so its elements can be implemented elsewhere) or dedicated to a given course (customized). The first group embraces general game rules and their application (also in non-educational contexts); the second one is tailored to a given course and includes the subject specifics.

Simple elements were introduced to students of Software Engineering course at Lublin University of Technology (Poland). They included points for attending classes, completing test, final project and bonus voluntary task; final marks depended on the final score and place in the ranking (Borys and Laskowski, 2013). This points-only gamification increased class attendance and number of bonus tasks completed although final results showed that the gamified students’ motivation was decreasing. Another simple example is *ClassDojo*, a classroom management tool, that introduces instant feedback for positive behavior. The reinforcement is immediately visible on students’ mobiles (Chou, 2015). The program provides also behavior tracking analytics. *Brainscape* uses algorithms to create flashcards (mobile or web-based), whose presentation depends on a student’s progress. The progress is displayed as a percentage in the way to Mastery (Brainscape, 2015). Similar feature is the key element also in other spaced repetition applications (e.g. *SuperMemo*). Cristina Ioana Muntean and Strada Mihail Kogălniceanu (2011) propose general rules that can be applied to any (e-learning) course: avatar/profile customization, cascading information flow, feedback, points, levels, achievements, leaderboard.

Dedicated gamifying programs are designed to suit the needs of particular classes/ subjects, they respond to special features of the learned material. For example, *Jigsaw* is a game helping to master *Adobe Photoshop* by trial-and-error method: users are asked to match the target image by manipulating puzzle pieces (color adjustment, scalding etc.). The game provides clear goal, multiple paths to success, feedback on progress and different types of hints (Dong *et al.*, 2014). Similarly, Microsoft's *Ribbon Hero* (Microsoft Office Labs, 2010) is an addon using points, badges and levels to learn *Microsoft Office* tools (Microsoft, 2015).

Playification

Gamification is sometimes interpreted as playification (van Turnhout, 2012). The main idea of playification is free play (opposed to structured game). Instead of concentration on scoring mechanisms (which may be stressing to users forced to participate) van Turnhout proposes offering people toys (not games) which would rather focus on story and free play. Surprise and curiosity are the core of playification. Educational examples of this approach include audience response systems where students anonymously answer questions related to a lecture by clicking wireless keypads and their answers (saved as clicker numbers, not real names) are tracked and displayed on competition slides (no grades associated) (Pettit *et al.*, 2015). Another case relates to the use of random rewards (free choice of: (1) virtual coin toss – 0 or 2 points or (2) 1 granted point for correct answer in a mathematical quiz) in reinforcing school children engagement (Howard-Jones, Demetriou, 2008).

Intrinsic Motivation and the Need for Autonomy

At first sight it seems that intrinsic motivation and compulsory education (or the social pressure to graduate) stand in conflict. According to self-determination theory (Deci and Ryan, 1985) this can not be the case. Intrinsic motivation is possible if three innate needs are satisfied: competence, autonomy (the sense of not being controlled), and relatedness. The state experienced when undertaking intrinsically motivated activity is similar to flow (optimal experience, Csikszentmihalyi, 1990). An individual's action is not instrumental but autotelic; it has purpose (fun, curiosity) in itself. In the gamification context, it is useful to mention organismic integration theory (Deci and Gagné, 2000), which (in frames of self-determination theory) moves accents from the motivation source (intrinsic or extrinsic) to the sense of control or autonomy (Ryan and Connell, 1989). According to this theory individuals can experience autonomy even when they receive external rewards. The motivation is not treated bipolarly (intrinsic vs extrinsic; internalized vs not internalized) but understood as a continuum of a degree to which external control is integrated. Behaviors can be based on (1) external regulation (compulsory classes), (2) in-

trojected regulation ('a good student attends classes'), (3) identified regulation ('since I am a student, I should attend classes'), (4) integrated regulation ('since I am a student, I want to attend classes') and (5) intrinsic motivation ('I'd want to attend classes even if I were not a student'). The last category is considered the purest kind of motivation – no external pressure is needed to undertake an activity. Of course, not every behavior is originally rooted in extrinsic motivation. The overjustification effect explains how internally driven behavior can become extrinsically motivated after being rewarded externally (Lepper *et al.*, 1973).

Teaching without any form of control is not useful in educational systems. Assuming that some degree of control is needed, it is important to answer the questions: What kind of rewards can undermine intrinsic motivation to the lowest degree? Under what conditions will an intrinsically motivated student NOT lose internal interest in learning?

Meta-analyses of research on the effects of rewards on intrinsic motivation have not produced consistent results. On the one hand, it is indicated that rewards have a moderate negative effect (Cameron and Pierce 1994; Eisenberger and Cameron, 1996; Cameron *et al.*, 2001); on the other – that this effect is pervasive (Deci *et al.*, 1999; Deci *et al.*, 2001). From both perspectives, tangible, expected (offered beforehand), and loosely-tied-to-the- level-of-performance (completion-contingent) rewards are harmful, while positive feedback is enhancing. Other conditions however have brought controversy. According to Cameron *at al.* (2001) in the case of low-interest tasks, rewards enhance free-choice intrinsic motivation. On high-interest tasks, positive or neutral effects can be observed in the case of verbal rewards or ones linked to the level of performance. On the other hand, Deci *at al.* (1999) argue that performance-contingent rewards significantly undermine intrinsic motivation. The controversy has been partially resolved by Houliort (2004) who showed the undermining effect of performance-contingent rewards on the affective experience of autonomy (enhanced feelings of pressure and tension) but not on the intrinsic motivation of college students (school children's motivation was increased). The theoretical and practical implications of the above findings can be addressed in the context of gamification of education. First, it can be expected that external rewards may raise the intrinsic motivation of students who are not interested in learning – which may ultimately lead to increasing the degree to which external control over learning is integrated. Second, verbal rewards are not always enhancing. The way positive performance feedback is presented may influence the experience of autonomy (Ryan, 1982). Verbal feedback for doing very well on a task and the usefulness of the data to researchers suggests a controlling aspect and undermines intrinsic motivation. The mere 'you are doing very well at the task' has an informational character and brings no negative effects (Pittman *at al.*, 1980; Deci and Ryan, 1982).

Extrinsic Motivation

Extrinsic motivation is best explained by conditioning mechanisms within a behavioristic approach. The classical experiment with cats by Thorndike (1932, p. 176) gave an empirical base to his law of effect: behaviors that produce satisfying consequences in a particular situation become more likely to occur again in that situation, and behaviors that produce unpleasant consequences become less likely to occur again in that situation. This rule determines the theoretical framework of operant conditioning and its development by Skinner (Ferster and Skinner, 1997) which is particularly interesting in the context of education. Skinner introduced the terms of positive and negative reinforcement or punishment, and analyzed schedules of reinforcement. Reinforcement is an event that strengthens or increases the behavior that it follows. Positive reinforcement occurs when a favorable stimulus is presented; negative, when an aversive stimulus is removed as a result of an operant behavior. Punishment, on the other hand, causes a decrease in the rate of the behavior that it follows. Positive punishment involves the presentation of an aversive stimulus, and negative, the removal of a favorable one. In the educational context, particularly important are schedules of reinforcement, i.e. rules determining which instances of a behavior will be reinforced. An effective way of increasing the rate of a behavior is using continuous reinforcement when every occurrence of the operant response is followed by the reinforcer. In education this might mean a reward (praise, points, or a grade) for a student every time a desired response (depending on the applied rules: a correct answer, completion of a task, or uttering an opinion) takes place. When it is difficult to use continuous reinforcement – which may happen in a school environment – partial reinforcement can be applied. In partial schedules not every desired reaction is reinforced. Behaviors are acquired more slowly, but they are also more resistant to extinction. There are four types of partial schedules: (1) fixed ratio – reinforcement delivered after every n th response (points for a class activity after every five statements); (2) variable ratio – behavior reinforced after on average every n th number of responses (points for a class activity after on average every five statements – a student is rewarded randomly but the number of rewards is related to the rate of reacting); (3) fixed interval – reinforcement delivered after every n th amount of time (points for a class activity only after a student's statement taking place at least 15 minutes from the beginning of every class – the next point can be expected only during the next class); (4) variable interval – behavior reinforced on average every n th amount of time (point for a class activity can be rewarded on average during every class, but it is possible to receive two or no rewards during any specific class). A ratio schedule is more motivating since in this case the number of reactions directly impacts the number of reinforcements. An interval schedule, on the other hand, prompts individuals to wait. A variable ratio schedule creates a high and steady rate of responding and is resistant to extinction. Some additional notice can be given to this type of re-

inforcement since it is characteristic to gambling. Gamblers are not paid to gamble; their activity is based on a mix of extrinsic and intrinsic motivation. They gamble to win external rewards but are driven internally and feel autonomous. This phenomenon can be interpreted in biochemical terms: uncertain rewards expectation causes extra dopamine activity (Howard-Jones, 2008) which is usually associated with rewarding experiences (food, sex). In other words, uncertain rewards – although motivating externally – arouse such emotions as curiosity or excitement which are characteristic to intrinsic motivation. This observation may be particularly useful in an educational context.

Motivation in Games

It is useful to describe specific solutions when discussing motivation in games. An exemplary game analyzed in this article is ‘World of Warcraft’, one of the most successful and strongly motivating MMORPGs of the last decade.

A typical player of ‘World of Warcraft’ begins playing after being lured by game advertisements or the enthusiastic opinions of friends¹. He is like a child who receives a favorite toy. For the start he can choose and customize his character (an avatar), a moment later he is presented his first goals and quests. After several minutes his character has killed a couple of virtual enemies and talked to a couple of virtual allies, and has also reached a new level. Thanks to this he now has new skills and can inflict more damage, which helps in confrontations with more powerful opponents. After several hours the player can test his skills in PvP² competition (battlegrounds where ten player teams fight against each other) or – together with other players – test himself against more demanding monsters (elites and bosses in dungeons³). He has more and more pricey loot in his bags which can be sold to NPC vendors or to other players through an auction house. As a freshly invited member of a guild he meets new friends and chats with them between monster fights. He explores new zones, visits new towns and cities. He learns to cook and fish, sews his own clothes as a tailor, or forges weapons from metals gathered by himself. He challenges to a duel a player character of a much higher level and loses after a single stroke of a sword. But he knows that his character will be equally powerful within several days. But when more powerful, the player begins to feel a little tired. Reaching the next levels takes longer and longer, his favorite combination of spells, repeated hundreds of times, becomes wearying. Fortunately, destroying an enemy in PvP is still exciting, as well as chatting with guild mates on a guild channel.

When a player character finally reaches the maximum level, a new stage of gameplay begins. Further progress is possible within a PvP or PvE framework. If the player wants to be really successful, he must undertake multiweek tedious farming⁴. In PvE

mode this means killing monsters in 10 or 20-person player groups (raids). In PvP mode it is competing on battlegrounds or in arenas (solo or in a group). PvE activity takes at least 10-15 hours a week; PvP – from one hour to more than 10 hours. In ‘free’ time the player can till and gather crops (10 minutes – one hour, a daily task) or progress in ‘reputation’ with various factions (usually less than one hour, also a daily task). He may also try to gain points in so called achievements⁵.

The game is structured in such a way that each off-game week means a loss. In PvE mode, it makes it less likely to receive the dreamed-of loot from dungeons (which is given to those who attend more often); in PvP – it takes longer to buy the perfect gear (due to the weekly limit of collectible points). Ungathered crops mean the loss of serious funds available in other cases. When, after a multiweek effort, the player has gained everything he planned to, the play starts from the beginning: new, more powerful weapons become available and new, more difficult challenges appear.

A typical player of ‘World of Warcraft’, begins playing with curiosity and an expectation of fun. Soon, however, his strong intrinsic motivation is replaced by the need to receive rewards. The game structure described above shows – paradoxically – that it is extrinsic motivation (and not an intrinsic one) that underlies the majority of players’ motivations. For example, after reaching the weekly *conquest cap*⁶, players usually stop participating in PvP fights (because it does not bring them any further profit). They also usually do not organize PvE raids ‘for fun’, when the loot is not attractive. This effect is depicted by the afore-mentioned overjustification effect (Lepper *et al.*, 1973). And when the border between fun for itself and the race for rewards is crossed, another mechanism starts to regulate players’ behavior – psychological entrapment (Brockner and Rubin, 1985). Players become motivated not by the rewards *per se* but by the aversion to resigning from the activity in which they have invested time and effort. Every day spent on a game makes their dream goal closer.

To sum up, extrinsic motivation is shaped by the use of linear progress and point rewards. The following reinforcements can be observed:

- continuous reinforcement – points for killing monsters (to increase the experience level determining the base power of a character), points for killing a player character or for a victory in standard battlegrounds (to gain currency exchanged for better equipment), progress in developing a profession (in the case of production of more difficult items)
- variable ratio schedule – the value of the loot taken from NPCs (from poor to epic⁷), progress in developing a profession (in the case of production of less difficult items), points of reputation with some factions

- fixed interval schedule – points for a victory in arenas and on rated battlegrounds (the currency exchanged for the best equipment), crops from patches of soil, points of reputation with most factions, rewards for daily quests.
- On the other hand, the intrinsic motivation is shaped by:
- features satisfying the need for affiliation – the possibility of associating in guilds, group quests, the need for cooperation between characters with different skills or professions, communication channels and discussion forums
- exploration of game content and immersion
- domination and competition – competing against other players or NPCs

Some game features increase both intrinsic and extrinsic motivation: PvP rankings, PvE progress (the comparison of guild accomplishments), achievements and badges.

It is important to note that, according to self-determination and flow theories, in many cases players are rewarded relatively to a task's difficulty level: from no reward for too easy tasks to large rewards (more points) for more difficult challenges.

Gamification in Education Problems

It is a common mistake to assume that players are motivated, above all else, intrinsically. The overjustification effect (Lepper *et al.*, 1973) causes that external rewards (points or better equipment) move the driving force: an individual still experiences autonomy but his or her behavior is regulated externally. In terms of organismic integration theory, it can be said that external control has been integrated. However, comparing the integration of external control by students and players is inadequate. If, in the case of students, a gradual increase in the autonomy level is observed, in the case of players that autonomy level decreases. Applying game features in order to motivate students may result in failure if their starting motivation is too low.

General critical comments about gamification apply also to its use in education. For example, 'mandatory fun' (individuals engage in game without consent, gamification rules are imposed) decreases positive affect (Mollick and Rothbard, 2014) and may lead to zombification – senseless pursuit of external rewards (Conway, 2014). Steve Lopez (2011) uses the term 'electronic whip' to describe this situation. It is worth mentioning that in case of lack of autonomy or competence students may perceive gamification programs as additional source of stress. Instead of experiencing safe art of failure (Juil, 2013, p. 7) or freedom to fail (Stott and Neustaedter, 2013) they will fear extra pain of not levelling fast enough or not being high in rankings.

External rewards in games are used to support engagement when initial interest decreases. They provide tools for managing game content in a more efficient way. How-

ever, if a student is not interested in obtaining knowledge or skills, tools that help do so will not motivate him. When autonomy is lacking, external rewards (e. g. small monetary ones) obtained by safe trail and error method may serve the purpose of raising intrinsic interest. Apart from the possibility of earning funds, students might convince themselves (according to forced compliance effect (Festinger and Carlsmith, 1959)) that their activity was fun.

Practical examples of a gamified educational program are presented below. They address the problems mentioned above. Also, the underlying rules are explained.

Assumptions

1. Initially, the student's motivation (intrinsic and extrinsic) is low or there is no motivation.
2. In the case of lack of interest in obtaining knowledge, mechanisms which increase initial motivation should be applied. Not assuming this might cause that features provided to shape intrinsic and extrinsic motivation will be ineffective.
3. Intrinsic motivation can be shaped by mechanisms facilitating social interactions, exploration of game content and immersion in it, as well as competition between students.
4. Extrinsic motivation can be shaped by a structurization of knowledge (goals and tasks, challenges, badges, linear progress and reaching experience levels, rewards which help to gain an advantage over other students in competition)
5. Low motivation can be increased by using monetary rewards paid according to a continuous, variable ratio and fixed interval schedules. Inserting a coin into a slot machine is not a fascinating activity unless accompanied by the thrill of imagining the potential win. The possibility of winning motivates gamblers to take action that would not arouse interest otherwise. Using 'gamblification' and a variable ratio schedule in an educational program should serve sustaining engagement in the case of no other motivation. Using a fixed intervals schedule would be a guarantee of keeping motivation on a level that would enable further progress.
6. It is the decision of those who coordinate an educational program to decide how much control over students is needed. The possibility of cheating is one of the most important issues in gamified programs. No control over who actually plays may cause possible abuses: more advanced students may perform tasks for less advanced or unmotivated ones. The problem is even more serious in the light of the fifth assumption. A desire for profit might cause unintended cooperation – using the assistance of more competent students to accelerate earnings. It seems that there is no uncompromised solution to this. Possible partial solutions are the following:

- playing can take place exclusively under the control of a coordinator at certain hours and in places designed for it (e. g. a computer lab) – this provides full control over players, but a significant decrease in autonomy
- playing can take place anywhere and anytime – grants full player autonomy but the possibility of abuse
- most of the game content can be played anywhere and anytime, but certain levels can be reached only after performing tasks under the control of a game coordinator (in terms of the coordinator, this would be a control test to verify if a student has dealt with the course material personally; in terms of a game it would be a kind of difficult quest, or a dungeon) – large control over the player and a minimal decrease in autonomy

From the point of view of learning effectiveness the third option seems the most interesting. Of course, other intermediate solutions are also acceptable.

Solutions

The sample gamified program described in this section covers the field of social psychology. Problems include attribution theory, cognitive dissonance, group processes, and others. The game would be available online.

Beginning the game

The student receives an e-mail with information about the game and a link to the home page, where he can log into his account. His first task in the game is to determine his preference settings. For example, a player profile may be a consequence of choices based on Bartle's taxonomy (1995): socializer (more group quests), achiever (wider availability of badges, better exchange rate of game currencies, more options to create one's own objects – for example, the research centers described below), killer (more competition quests, more points for critical approaches to problems, i.e. advantages while taking control of research centers owned by other players), explorers (more educational materials available, more help from a coordinator). For the first completed quest (reading a short text and answering questions to it) the player receives rewards (set up in advance): monetary, experience points, and game currency. Monetary rewards are based in this case on a continuous schedule and are not high. Depending on both the number of quests available in the program and on financial resources, they may vary from 1-2 cents to 1 dollar. From the psychological point of view the importance of small funds is large, as indicated by research on free products (Dooley, 2012)⁸. The payout of funds would be possible after some conditions are met (after a specific time, after a specific amount of funds are collected, etc.)⁹.

Experience points determine a player's level. A higher level allows the creation of research centers and gives access to new content. Game currency may be exchanged

for real funds or spent on a fee for various game features (for example, building research centers and hiring assistants, creating challenges for other players, access to new content). Additional currency may be dominance points or cooperation points earned by defeating other players or working with them. These currencies would give the same opportunities as the main currency, but would not be exchanged for real money (an option depending on the program's volume of financial resources).

Gameplay

The gameplay is about reaching the highest level, creating the best network of research centers, and gathering the greatest volume of real and virtual resources (currencies). Game progress indicates an increase in acquired skills and knowledge. Didactic materials should have a clear structure: from simple problems which would be worked on in simple quests – reading or watching the material and answering questions about it (for example, what are the ways to reduce cognitive dissonance?) – through more sophisticated issues (for example, conformity or research methodology), by which it is possible to build a research center, to the most advanced ones requiring not only studying didactic materials available within the program, but also independent searching among education resource databases and analyzing of the problem (for example, agentic state theory (Reicher & Haslam, 2011)).

The gameplay includes the following features:

1. Progress (the need for achievement)

- individual quests (mentioned above); there is the possibility of creating personal quests
- group quests (in the case of more complicated problems)
- daily quests – for example: requiring the answering of a question from a specific subject
- simple research centers – materials created by a player, based on sources available in the program (short essays or presentations). They should also include questions and indicate problems or difficulties. Each day of maintaining a research center gives an owner experience points and real funds (fixed intervals schedule). It is possible to hire other players as assistants. Additional points and funds are given for helping other players who seek information about the issue analyzed in the center. Centers are approved and observed by a program coordinator. There is the possibility to take over an already built center owned by another player (additional competitive motivation) – by defeating an owner and meeting specific conditions (for example, filling in materials). Battles between players (described below) may be judged by a coordinator or based on specific rules.

- advanced research centers – these operate according to similar rules as simple research centers, but require greater in-depth analysis of more specific issues. To build an advanced research center, it is required to first own a simple one. For example, a player can build a simple center of obedience to authority and on its base create an agentic state theory center.
 - access to free and paid (in game currency) content that helps building and maintaining research centers
 - achievements, badges and titles – for example: for completing at least one quest in ten consecutive days¹⁰, for defeating another player, for building a research center.
 - rankings – for example: rankings of player levels, earned domination points, number of forum posts, battles won
 - free questions – reading materials on a randomly chosen topic and answering questions (independently of quests); rewarded with real funds and game currency
 - gambling – investing owned currency points to win a bigger prize (for answering closed-ended questions from different topics)
 - ‘you are lucky’ – completing a mission or answering a question may be unexpectedly rewarded with an extra prize (for example, instead of 2 cents a player receives 1 dollar; variable ratio schedule)
 - experiments and questionnaire research – prepared in research centers and rewarded with points
 - challenges – quests made by a player for other players
 - GM¹¹ challenge – defeating a program coordinator during a dungeon quest; it would be followed by a big monetary and virtual reward
 - progress bar – linear and numerical representation of points and currencies earned (owned) by a player
 - statistics – diagrams, graphs and tables presenting a player’s achievements; it is possible to ask for automatic help to find out how to invest currencies and time in the most profitable way at the moment
 - dungeon – consultations with a coordinator (a verification of game progress)
 - rewards for winning the game – financial or material reward (a voucher to a cinema, hotel, spa, or restaurant; a holiday trip)
2. Competition, cooperation and other social needs
- battles – questions and answers on a specific topic (duels or group battles)
 - cooperation tasks – points earned by two players giving exactly the same answer (a description of a situation presented in a text or shown in a picture¹²)
 - group quests (in the case of more complicated problems)

- taking over and defending research centers
- discussion forums and chat rooms
- player appraisal – penalty points for cheating or appreciation points for providing help or competence, given a player by other players
- guilds – associations of players who undertake challenges or work together on specific topics (the feature includes better communication tools – a personal forum, chat room, and conference system (e. g. Skype))
- stock exchange – players can exchange their currency points at a standard rate (different currencies earned by a single player) or in an auction system (between players)

Rewards for completing a mission would be available only once and their value would depend on the level of difficulty. A player would receive more points for higher level tasks and less points for lower level tasks. For a low level player some quests and features would be available only after reaching a higher level. Similarly, completing some quests might give access to extra possibilities (e. g. reviewing the forum posts of other players, or creating challenges).

It should also be mentioned that some features would be available automatically (simple quests, rankings, cooperation tasks) and some would require coordinator assistance (building research centers, experiment review, resolving disputes). The coordinator assistance would also be needed to verify a player's progress and eliminate cheating. Further progress would be possible only after completing dungeon quests.

Some tasks would be performed in real time (short time limit for answering a question in a quest or during a battle); some however would require preparation (writing an essay necessary to build or take control of a research center).

The gameplay would be generally open since there are no limits in broadening knowledge. However, the end of the game could take place within a time limit (the academic year) or by reaching the limit of available funds (a player could continue 'for free').

Difficulties

Designing the program mentioned above is not an easy task. Success depends on creating a good logical structure for the didactic material. It is important to divide content into logically connected portions; obtaining the basic knowledge should give skills for coping with more difficult problems. Another difficulty is related to coordinator assistance. S/He should not only be expert in the gamified field, but should also have the ability to notice and resolve conflicts and make decisions based on objective judgement. Technically difficult may be balancing the rewards and assigning them to tasks. The reward value should be determined in advance and should accommodate possible abuses (for example, a conspiracy by players to refrain from attacking each others' research centers).

Of course, the option of a ‘free’ game (where financial motivation and earning real funds would be removed) is possible, but it might implicitly lower students’ motivation in general. A final difficulty is related to creating a clear, intuitive, graphically pleasant interface, clear information about tasks and rewards, and an easily accessed help system. It should be mentioned here that the audio-visual design and easy access to game features may decide about players’ level of immersion. Simple animations (e. g. after competing a quest or reaching a level) and sounds (e. g. during a battle) may become the conditioned stimulus triggering positive emotions.

Summary

The article presents practical solutions for a gamified educational course. It proposes using mechanisms that increase both intrinsic and extrinsic motivation. One novelty in relation to existing programs is the introduction of financial reinforcement. This solution may seem controversial, but has strong empirical support in research on operant conditioning. Additionally, in the proposed sample program, more attention is paid to mechanisms involving the natural human need to compete and cooperate.

Where and how this program could be implemented? Firstly, the full gamification of a short academic course (15 or 30 hours) might be ineffective as the psychological costs and educational benefits of transition from standard learning to the one described above would be disproportionate. The proposed gamification might be useful if a group of courses were regulated by the same rules (similarly to the mentioned before Just Press Play project) or the single content-rich course was run year-long. Fluency in using appropriate game instruments is crucial and students should be given time to get used to them (just like in games – extra options and additional features are introduced gradually as a player progresses). In case of shorter courses some gamification reductions might be considered.

Secondly, the final shape of the program depends on initial intrinsic motivation. This relates to attitudes to both taught subject and gamification. Low interest in learning might require the use of tangible rewards (e. g. monetary ones) and – on the other hand – aversion to role-playing or to any forms of ‘unserious’ activities might undermine initial intrinsic motivation. That is why complex gamification systems are used in game/technical studies (e. g. Just Press Play). The safe implementation of the project proposed in this article should involve voluntary participation in non-obligatory courses or – in case of obligatory ones – possibility of choosing either gamified or standard mode of learning.

Thirdly, the solution described in this article would suit open, web-based, non-academic educational programs (for example, related to enhancing different types of com-

petences or broadening knowledge in adolescents). Additionally, the project might be using Facebook as starting point or a thought exchange platform, which in the era of technology and social media savvy Generation Z would serve as a sneaky way of bringing educational aspect to social or entertainment activities.

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Footnotes

1. The gameplay description is a result of an analysis of ‘World of Warcraft’ made for the purpose of the current article.
2. Player versus Player, a term used in multiplayer online games to describe a part of gameplay when players compete against each other. The term is in opposition to PvE (Player versus Environment) when players fight against non-player characters (NPCs).
3. Dungeon (for instance), a term in game jargon denoting a closed location generated directly for a player or group of players. The challenges players meet in such locations are usually very demanding and often require cooperation.
4. Farming: a term in game jargon to denote a boring and longlasting repeated pattern of behavior to gain certain profits.
5. Achievements (World of Warcraft): the classification of a player’s accomplishments. Achievements are reflected by point scales and can be compared between players.
6. Conquest cap (World of Warcraft): the weekly limit of currency earned in arenas or battlegrounds. Conquest points are spent for the best available PvP equipment.
7. In most MMORPGs items may be classified according to their value which is graphically represented by using specific colors in their description. For example, in World of Warcraft the least valuable are gray items (*trash loot* or *vendor drop*) and the most valuable are purple (*epic*) or orange (*legendary*) ones.

8. Studies quoted by Dooley (2012) indicate significant preferences for free low value products over more valuable ones with their price reduced to 1 cent (chocolates). The difference between a free product and the one costing 1 cent is important from the psychological point of view. In the case of monetary rewards in an educational program the issue would not be a loss (1 cent vs free) but a gain (no reward vs small funds). An example of the motivating force of small funds may be the possibility to earn money in 'Second Life' (1 cent for a caught fish).
9. Paying players for progress in learning might raise some objections about undermining a potential initial intrinsic motivation according to the mechanisms of cognitive dissonance reduction and external justification (Festinger and Carlsmith, 1959). These objections can be dismissed by indicating that small funds do not give sufficient justification. The aim of using them is to arouse motivation – not to convince a player that he plays solely for money.
10. Performing a task for an amount of consecutive days may motivate according to the mechanism of psychological entrapment (Brockner and Rubin, 1985). This mechanism is used not only in games but also in business to increase customers' engagement.
11. GM (Game Master) – a term used in multiplayer online games to denote a person who moderates a game, answers questions and resolves disputes. Terminology used in a gamified educational program may be consequently taken over from games (GM for program coordinator) or – alternatively – program's own terminology could be created (e.g. problem instead of quest).
12. This task is based on mechanisms used in *games with a purpose* (GWAP). For example, ESP game (<http://www.gwap.com/gwap/gamesPreview/espgame/>) is about giving the same name to an object presented in a picture by two players independently of each other.