Chapter 7
Games and Gamification in the Classroom

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Abstract The power of seduction generated by video games in the new generations makes its use in education promising, which helps to achieve a highly motivated group of students and obtain a more efficient learning. This is how the Serious Games and the Gamification arise. The first ones are interactive software specially designed to favor the acquisition of knowledge and skills or behavior changes, in an environment similar to videogames. The second one just applies the elements and mechanisms that make videogames captivating, although used in non-game contexts. The idea behind this consists in offering students playful/fun motivational experiences and transforming the learning process into a much more attractive one. The experiences already conducted with both proposals provide results that invite us to continue moving forward on that path.

Keywords Games · Gamification · Active learning · Motivation

7.1 Introduction

While playfulness has always been present in society, video games have introduced a new game mechanic that has captivated users for several decades, especially young generations. These digital applications generate unique behaviors, which can motivate users to interact with them with incomparable intensity and duration (Dele-Ajayi, Strachan, Pickard, & Sanderson, 2019; Deterding, Dixon, Khaled, & Nacke, 2011). As an example, we can observe our students performing the same repetitive action over and over again to move to the next level in a video game, while in a traditional course they give up after the first failure in the attempt to solve an assignment.

This leads us to think that, obviously, there is some aspect in computer games that we are not offering in the classroom. At this point, the question is, if the games are so captivating, why do not incorporate them into educational practices to achieve that same engagement in the classroom.

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Thus, the use of computer game techniques in education is part of the effort to address the needs of generations of digital natives, known as "Generation Z", "Gen Next" or "Gen I", (born between 1990 and early 2010), which are characterized by being self-directed, capable of processing information quickly, exhibiting short term thoughts and preferences, and wanting to achieve everything immediately (Furdu, Tomozei, & Kose, 2017; Wilson, Calongne, & Henderson, 2016).

Many researchers have analyzed the characteristics of games that propitiate players to have fun, in order to apply them in the educational process (Llorens-Largo et al., 2016). Thus, two strategies appeared, at different historical moments. On the one hand, the use of video games, either on desktop computers or mobile devices, specifically designed to train students in some skills or to achieve levels of understanding on some topics, which are called Serious Games (SG). On the other hand, the use of some rules and mechanisms typical of video games (which may or not involve software) throughout the development of a topic or complete course, which is called Gamification.

Regarding the last strategy, it is worth mentioning that the term Gamification applies to the design and development of the approach to a complete course or a whole topic (including its evaluation), applying videogame mechanisms, without actually playing those games. That is, create levels that must be achieved through challenges, offer prizes, progress status, etc.

In this chapter, we will cover both strategies, taking into account that the application of steps to gamify a course or a topic may be more accessible to a professor than the use of serious games which should be acquired or developed for computers or devices.

7.2 The Key: Motivation

Through Neuroscience, we know that students need motivation and a sense of achievement to fight a challenge. It they feel that they have overcome a difficulty/challenge, they will go a step forward to the next level (Villagrasa & Duran, 2013).

This is consistent with Fogg's behavior model, in which all behavior is reduced to three factors: trigger, ability, motivation. The first is the action that triggers the potential behavior, the ability indicates how easy it is for the person to perform the action and the last factor refers to how much the individual wants to take the action or obtain the desired result. In order to exist an action, all three components must be present. For example, the trigger could be somebody knocking at your door, then you can have the ability to go and open de door, but you need the motivation to do it. In particular, when there is no motivation, no matter how easy the task is, the individual will not do it (Chou, 2017).

Regarding motivation, the theory of psychological self-determination proposed by Deci and Ryan (1985), identifies three factors that determine the motivation of people to perform a task, namely, the need for competence, the need for autonomy

and the need for social relationship. The first one refers to the level of efficiency that moves each human to feel competent in the environment with which she/he interacts. The second one refers to the freedom to make decisions based on their own values and interests without external pressure. The third one represents the individual's basic desire to integrate coherently with the social environment (Chou, 2017; Furdu et al., 2017; Llorens-Largo et al., 2016; Sailer, Hense, Mayr, & Mandl, 2017).

However, we can recognize two types of motivation: extrinsic (external incentive) and intrinsic (personal satisfaction). Intrinsic motivation is what is obtained by inherently enjoying the task itself. Extrinsic motivation is the motivation that derives from a goal or reward, compared to a task that is not attractive, but we do it to receive the award (Chou, 2017).

It is clear that, in routine tasks that do not require creativity and have little intrinsic motivation, extrinsic motivation can contribute for improving results. On the contrary, in creative tasks that need some cognitive ability, the rewards can reduce the approach. It is very important to take this aspect into account in the education environment.

Llorens-Largo et al. (2016) expresses that the combination of both types of motivation produces a deeper level of motivation. In this sense, game-based learning can increase learning efficiency if intrinsic motivation is achieved by linking learning materials with a specific objective of the game, beyond the extrinsic motivation produced by the game elements (Elaish, Ghani, Shuib, & Al-Haiqi, 2019).

7.3 Serious Games and Pervasive Games for Learning

Formative games are defined as games specially designed for a specific purpose other than pure entertainment, such as military, medical or labor training, among others. In this sense, a card game whose purpose is for young children to learn colors becomes a formative game.

With the arrival of the video games, the term Serious Game (SG) become synonym of computer formative game, that is, a software designed to acquire knowledge, skills or behavior changes (Hussein, Ow, Cheong, Thong, & Ale Ebrahim, 2019).

From the end of the 20th century, this new kind of interactive software begun to being used in classrooms with the goal of add motivation and fun to the learning process (Deterding et al., 2011). For example, Wired is an SG designed by researchers at the University of Cambridge, which allows young people to understand concepts of electricity.

As with other types of software, SGs have moved from desktop computers to mobile devices, which, most of them, run interchangeably on multiple platforms.

It is important to note that, although authenticity is important regarding the reality that the SG presents (physical laws, recreation of professional environment, etc.), this does not imply that it should be a perfect reproduction of reality. Moreover, high fidelity can lead to a lower learning performance, since the student may require too much time to familiarize himself with numerous details, instead of focusing on the main learning objectives (Ney, Goncalves, & Balacheff, 2014).

Related to motivation, given the way in which these games are usually designed, with several short-term objectives and a long-term final objective, in general, students are motivated by gradual progress in obtaining intermediate achievements until reaching the ultimate goal (Dele-Ajayi et al., 2019; Llorens-Largo et al., 2016).

Taking into account this flow of playability, it is essential to achieve a good balance between the challenges and the skills of the student: if the tasks are too easy or the challenges are extremely difficult to achieve, the student will lose motivation. Software designers must take care of increasing challenges, to match individual skills and student progress (Chou, 2017; Llorens-Largo et al., 2016; Thomas & Young, 2010).

Augustin, Hockemeyer, Kickmeier-Rust, and Albert (2011) express that, in order to be educationally effective and to keep the student's motivation in playing and learning, it is crucial to achieve intelligent adaptation to his/her preferences, skills and motivational and emotional states. It is clear that this adaptation is not trivial and requires a subtle balance between the challenges presented through the game and the student's abilities at each stage. Undoubtedly, educators must be included in the development team of an SG software.

Another advantage of the SGs is that they can be designed to provide a high degree of personalization, guiding the student in their progress through small tips and instant feedback. This effect decreases any frustration and increases the effectiveness of learning (Bowen, 2012; Cheng-Yu, Kuo, Sun, & Pao-Ta, 2014).

Cheng-Yu et al. (2014) show several results of research on the use of SGs. Most of them indicate the potential of using digital educational games to improve student learning performance, since they can increase their interest and motivation. In particular, some findings show that although a mobile game generates a learning result equivalent to its computer game version, students prefer the game with a multi-touch mobile interface.

As Dele-Ajayi et al. (2019) mention in their work, the SGs give the student the possibility of failing in a safe environment where their actions have no catastrophic consequences. In addition, they significantly reduce the stigma felt by students who take longer to complete their tasks, since they can move at their own pace, without delaying the rest of their classmates.

The latter results are very important, since the error must be a source of learning and progress. Perceiving error as normal and using it for deeper analysis makes students less fearful and more open to experiment (Llorens-Largo et al., 2016).

In this sense, serious games offer the great advantage of allowing experimentation without fear of failure, in a playful environment and at the student's own pace. For this, the design of the activities must allow repetitions in case of an unsuccessful attempt, with the corresponding feedback that ensures the correctness of the stimuli in future activities (Furdu et al., 2017).

The options of SGs in education are enormous, and they keep growing and branching out. In fact, the appearance of mobile SGs has allowed the development of a new type of SG, the pervasive game (PG). The PGs introduce context awareness, as they connect the virtual game with the physical environment of the student's location (Laine, Sedano, Joy, & Sutinen, 2010).

We want to emphasize that the key of the PGs is not that the student can play them at any time and physical space (what is known as ubiquitous learning), but that the objects, actors and situations of the geographical space in which the student is located are introduced in the scene, through sensors and smart tags. The surrounding context becomes central, as it provides outstanding resources for learning (for example, objects in a museum).

As a limitation to the strategy of using SGs in learning, we must mention that there would be two ways to acquire them, buying the applications or developing them. The second one involves forming a team of experts, including education experts, visual designers and software developers, which means lots of resources. In fact, both of them involve costs that, probably, an institution cannot always afford.

7.4 Gamification in the Classroom

Adapting game practices within the workplace dates back to 1984, when Charles Coonradt explored the value of adding game elements at work, summarizing in five aspects the fact that people would pay for the privilege of working harder on their chosen recreational activity, with respect to what they would work in their usual job, where they really get paid. These aspects are: clearly defined objectives, better punctuation, more frequent comments, greater degree of personal choice of methods and consistent coaching. However, the first documented use of the term Gamification itself dates back to 2008 and its widespread adoption only appears in mid-2010 (Deterding et al., 2011).

The basic principles of gamification have been used for more than a decade in areas such as electronic commerce, user loyalty programs and fitness programs for health. The ultimate goal of these schemes is to increase the commitment of users (customers, employees). For example, companies such as Starbucks, Nike, eBay, Salesforce and Badgeville are among the organizations that have been successful with the concept of employing game-like activities to improve business and customer interaction (Burke, 2014).

For most authors, gamification is not a game, nor a serious game used in the classroom, nor a generalized game used in non-formal contexts. But, as is often the case in all new and expanding fields, there is no single unanimous definition. The simplified definition, based on Dixon, Khaled and Nacke, is that Gamification is the use of video game design elements in non-game contexts (Deterding et al., 2011).

In (Llorens-Largo et al., 2016) we find a more complete and descriptive definition, created from all existing definitions, and on which we will base this section: “Gamification is the use of strategies, models, dynamics, mechanics and game elements in non-game contexts, in order to convey a message or content or change behavior through a playful experience that fosters motivation, involvement and fun” (p. 227).

To define the components of a Gamification, we will use the Hunicke, LeBlanc, and Zubek (2004) model, who defines a framework to develop videogames, which recognizes three central components: Mechanics, Dynamics and Aesthetics. The first

one is made up of the rules and basic operation, that is, the restrictions under which the game operates. It indicates what can or cannot be done, and what effects each action produce. The second one describes the operation when the rules are set in motion, and reference to the strategies that emerge from the rules and the way in which the participants interact. The third one, contrary to what we can intuitively think by its name, does not refer to the visual aspect, but to the emotional response of the player to the game.

The Mechanics of the game are based on tools, techniques and elements that stimulate the motivating aspects of the participants. They must be well defined and must specify, among other aspects, what they are and how to obtain the elements of the game, how to gain reputation, etc. (Da Rocha Seixas, Gomes, & de Melo Filho, 2016).

The Dynamics must guarantee activity cycles with tasks that are rewarded by the system, to generate positive emotions and increase engagement. Through game techniques, players are driven to different behaviors in game time. For example, fellowship can be encouraged by providing challenges that are easier to achieve in cooperation with other participants.

It should be mentioned that, the rules of mechanics can also help to adjust the dynamics. As an example, you can define rules to keep the lagging students competitive and interested for longer periods of time.

Finally, the mechanics and dynamics of the game come together to trigger fun in the players, which in the model is called the Aesthetics of the game (Ibanez, Di-Serio, & Delgado-Kloos, 2014; Sailer et al., 2017).

In Table 7.1 we can see a list of the most used gamification elements, together with a brief description of each one.

Although gamification is promising to increase the motivation and engagement of students, especially digital natives, its application to the learning environment deserves some clarification.

Promoting student autonomy is a very important point. In that sense, offering optional elements is a good strategy. Our brain hates having no options, but neither does it enjoy having too many options, which leads to a decision paralysis. Having two or three significant options ensures empowerment without overwhelming (Chou, 2017).

With this premise, a Gamification system should not present a guide to exercises or mandatory tasks. Students should be able to choose the tasks they wish to perform, probably based on the strategy that more points can be earned if difficult tasks are chosen (Furdu et al., 2017; Llorens-Largo et al., 2016). Other ways to promote autonomy could be letting the student to choose a reward from a pool. For example, a reward could allow the student to choose between 30 extra minutes of time or the triple help option for the execution of the next challenge.

Regarding the competition, many authors suggest that personal interactions offer more effective learning compared to those achieved in competitive environments, partly because a greater variety of learning styles and perspectives is accessed (Dele-Ajayi et al., 2019).

Table 7.1 Most used elements in gamification

Element	Description
Status points	They are awarded for completing tasks, for reaching winning states
Exchangeable points	They can be accumulated strategically with special event and redeemed for other valuables, or exchange them with other players
Levels	They are the different stages of progression and/or difficulty
Trophies, medals, badges	Visual representation of the achievements. It is used as a form of feedback on the progress and behavior of users within a system
Challenges	Goals to achieve. In general, they are regulated from less to greater complexity, to some very difficult final challenge
Feedback	Instant feedback is closely related to intrinsic motivation to want to solve a challenge
Progress bars	Graphical representation of progression and own achievements
Leaderboards	Allow you to see an achievement compared to the rest of the participants
Evanescent opportunities	It is an opportunity that will disappear if the user does not take the desired action immediately
Countdown timer	It is a visualization that communicates the passage of time towards a tangible event
Appointment dynamics	An absolute time is stipulated for an event to occur. For example, every Friday at noon
Torture breaks	Sudden pause, usually triggered in the desired actions. For example, try again within 3 h
Milestone unlock	It opens up some exciting possibility that didn't exist before reaching that milestone
Animated pop-up	Pop-up window with an animation, which appears suddenly
Easter eggs	Unexpected rewards that appear suddenly
Random rewards	Unknown reward at the time of doing the required action (the use of chance increases emotion)
Collection set	Series of elements of a certain theme that can be accumulated
Gifts	Resources that can be shared with others
Social treasures	Rewards that can only be obtained as gifts from other players
Virtual goods	Intangible objects that can be acquired with interchangeable points
Embedded videos	Video embedded in the middle of an activity
Avatar	Visual representation of the player

In that sense, we believe that it would be interesting to generate rules so that in the dynamics of the game the most advanced students offer help to their classmates, taking into account that, far from being delayed in their own progress, they would increase their status.

In support of this, instead of classification tables, it would be useful to offer contextual status maps. That is, maps in which each student sees their position, both with respect to their personal progress, and with respect to group progress. An

alternative is to use the color map strategy, indicated in (Auvinen, Hakulinen, & Malmi, 2015).

It is also interesting to include a narrative. The narrative allows students to be more interested in everything that is being presented and will give more meaning to the participation. There is no need for complex stories, just a simple and well thought out base story that provides a framework for the rest of the game elements (Chou, 2017; Furdu et al., 2017).

7.4.1 Methodology to Gamify a Course

Methodology to gamify a course is not a trivial task, since it must be carefully designed to maximize student enjoyment, without detriment to the level of the course. How to use the elements, when they should appear and for what specific purpose, make the essence of a good design, ensuring double motivation, intrinsic and extrinsic.

Many people think that gamify a course to make it more enjoyable and motivating could be limited to add points, badges and a leaderboard to the usual boring tasks. Unfortunately, this is not the case. As we mentioned in the Sect. 7.2, the fun is not only given by the extrinsic elements of the game, but also by the elements of strategy and significant activities offered (Burke, 2014; Chou, 2017; Ibanez et al., 2014).

An effective design implies the integration of the game elements with the task itself, rather than simply adding them above it. In fact, a scoring system that simply counts the number of exercises solved will not help the student to establish a meaningful connection with the underlying task, nor will it motivate him. Without a doubt, organizing a gamified context requires hard initial work, but once students get into the dynamic, the burden on professor changes and the game feels like an organic and natural part of the course (Wilson et al., 2016).

To achieve a true connection between the students and the gamified context, they must feel something significant, feel that through this strategy they will achieve a final objective, progressing through the achievement of intermediate objectives. This will balance the external motivation, given by the rewards, with the internal motivation, obtained by completing challenging tasks.

Beyond the proposals of many authors, Chou (2017) has spent a decade working to analyze strategies around the various systems that make games attractive and fun, to determine the factors that make people passionate about them. The end result is a design framework called Octalysis, composed of eight specific motivations offered by the most successful games. The eight motivations, with strong justification through Psychology and Neuroscience, work together to create a unified and motivating experience, although for each user some of them have greater preponderance than others. This framework can help define the best motivational solution for the design of gamification experiences.

The Core Drives for Gamification of the Octalysis Framework (Chou, 2017) are:

1. Epic Meaning & Calling: motivation to feel involved in something bigger than yourself.
2. Development & Accomplishment: motivation for the desire for personal growth and the achievement of objectives.
3. Empowerment of Creativity & Feedback: motivation generated by the satisfaction of creating elements and transforming reality.
4. Ownership & Possession: motivation driven by our feelings of owning something and, consequently, the desire to improve it, protect it and get more.
5. Social Influence & Relatedness: motivation based on the desire to interrelate and position oneself in relation to the rest of the people.
6. Scarcity & Impatience: motivation to obtain something that we perceive as scarce or difficult to obtain.
7. Unpredictability & Curiosity: motivation that comes from the attraction produced by the element of surprise.
8. Loss & Avoidance: motivation comes from the fear of losing something that represents our investment of time, effort, money or other resources.

Based on the proposals of Chou (2017) and Wilson et al. (2016), we offer a sequence of steps to design a good Gamification experience.

- Step 1: Identify the main objective. This step is crucial to give meaning to the whole gamification. In the education environment, this objective could be to increase student achievement, increase the presentism to the course, etc.
- Step 2: Identify the type of user. Although in our case we talk about students, a sub-classification of the group, based on some small initial survey, would allow better adjustment of some game elements. It is important to detect the distribution of the Octalysis cores (kind of motivations) among the students of the course.
- Step 3: Identify other objectives that are interesting for students. These objectives will form the basis on which the mechanics and dynamics of the game should be built.
- Step 4: Define the desired actions that lead winning states at each stage. We must think of actions for the stage of incorporation, scaffolding, etc. For example, actions can range from watching an interactive video, searching for an article on the web or solving an exercise to create a question for the rest of the classmates, among many other options.
- Step 5: Define the feedback mechanisms. The chosen mechanisms, in addition to informing the students that their actions are significant, should allow them to track their progress towards the winning state. All feedback mechanisms should become triggers that further promote the desired actions. (Remember Fogg's theory in Sect. 7.2). Table 7.2 shows some of the game elements described in Table 7.1 in relation with the 8 Octalysis motivations.
- Step 6: Define incentives and rewards. These elements are provided to the student when they perform the desired actions and reach the winning state. They can be elements of the game, or even tangible objects, such as a gift book, temporary participation in a project, etc.

Table 7.2 Impact of elements in the motivations of Octalysis

Element	1-EM&C	2-D&C	3-EC&F	4-O&P	5-SI&R	6-S&I	7-U&C	8-L&A
Countdown timers						x		x
Milestone unlock			x			x		
Embedded videos	x				x		x	
Status points		x		x		x		
Collection sets		x		x		x	x	
Certificates		x		x	x	x		
Insignias		x	x	x		x	x	
Animated pop-up	x	x			x	x		x
Progress bar		x	x	x	x	x		x
Exchangeable points		x	x	x		x	x	x
Social treasures				x	x			

Once again, we emphasize that the choice of the elements that will be used in the gamified course or subject should cover all possible types of motivations, to ensure that all students are deeply involved and achieve their maximum commitment and performance.

All people respond more or less to the eight mentioned cores, but some of them will always have more preponderance than others according to each personality. If only recognition badges and leaderboards are offered, those students who have a greater inclination towards the Epic core and little enthusiasm for the Social Influence and Relatedness core, will not feel really motivated.

7.5 Examples of Appying Game Practices in Learning

In this section, we present some serious game developments and various experiences of gamification designs for education.

We hope to motivate the readers to apply some of these ideas in their courses.

7.5.1 Serious Games Applications

As an example of SG, we will detail the ELEKTRA (Enhanced Learning Experience and Knowledge Transfer) project, in which a SG was developed through an interdisciplinary approach to cognitive science, neuroscience, pedagogy, and videogame design and development, led by researchers from universities in Austria, Germany and Belgium (Kickmeier-Rust et al., 2006). In it, students acquire specific concepts of a physics course through a series of first-person adventures. The goal is to save Lisa and her uncle from the hands of the black Galileans. To achieve learning, there are various resources, from listening or reading to freely experimenting. For example, to learn about the propagation of light, the student must experience several options, using a torch and blinds on a basement table. Until the student can understand that the light propagates in a straight line, she/he will not be able to open a door with a laser beam to continue the game. To provide micro-adaptive interventions, the non-player character named Galileo is used. The interesting thing is, as the system continuously interprets the student's actions in terms of their knowledge, the students gather information about the progress of their learning (Augustin et al., 2011).

Taking into account that students easily manage mobile devices and the fact that objects in the real-world environment can be incorporated within the applications, we present below two PG developments for learning. For more details, read (Laine et al., 2010).

SciMyst is a PG adventure, which was used at the annual SciFest science festival in Joensuu, Finland. SciMyst players use mobile devices to explore the festival arena by solving intriguing puzzles related to surrounding objects and phenomena. The game can be played alone or in groups. The puzzles range from multiple-choice questions to tasks to take a picture in which a certain object appears. The game uses 2D barcodes to detect objects and player locations. At the end of the game, the player has to overcome a final challenge where the acquired knowledge is checked.

Heroes of Koskenniska is an environmental awareness PG that was used in the Koskenniska Mill and Inn Museum area in the UNESCO North Karelia Biosphere Reserve. The temperature, humidity and lighting sensor readings are used as base data for the game, in which the student crosses the forest and the museum area while solving various types of tasks. The game's story is based on the epic battle between Ukko and Hiisi, characters from the Finnish epic story Kalevala. At the end of each level, the student faces Hiisi in a special battle where they must combine the acquired knowledge of the level and the sensor data.

While these applications are extremely fun for students while they achieve their learning objectives, obtaining them can be a limitation for the professor, as we explained at the end of Sect. 7.3.

Finally, it should also be noted that although so far SGs have been applied to content understanding and knowledge building, future research should explore how SGs could influence student learning in other areas, such as creativity and critical thinking skills (Hussein et al., 2019).

7.5.2 Gamification Experiences

Contrary to the use of SGs, which involves the development or purchase of some specific software, the gamification of a course can be easily developed by any professor, although its initial design is not a trivial task. Below, we present several reported experiences.

At the University of Michigan gamification has been applied in an IT course, at the University of Indiana the experience was carried out in a multi-user game design course, and at the University of Bond (Australia) professors gamified two courses, the Game Design and Logic, and Animation courses. In all cases, they worked on the modification of the material to adapt it to the game challenge. In addition, optional activities were provided and the grades were changed to experience points. The results indicated a lot of engagement of the students, who also expressed that they had acquired better knowledge regarding other traditional courses. Even in the case of Michigan, the average grade of the gamified course rose from C to B, compared to the traditional course (O'Donovan, Gain, & Marais, 2013).

At the University of Cape Town (UCT) a very thorough work was done to gamify a computer course, with the aim of improving class attendance, understanding of content and problem solving skills (O'Donovan et al., 2013). The experience began with a survey to classify the type of personality of the students, to adapt the strategies of the game to those profiles. Gamification was pushed to the limit, giving it a visual aspect of the Victorian era and a narrative based on a subgenre of science fiction. Several short-range secondary objectives were raised, each explicitly linked to a reward structure, through a system of experience points. Puzzles and riddles were also raised to develop lateral thinking. The results determined that the gamification techniques used significantly improved students' understanding and particularly their commitment, in addition to a significant impact on course grades and class attendance.

We want to remark that, all the studies on the application of gamification in educational contexts report positive results, especially in regard to greater motivation and participation in learning tasks, as well as the enjoyment of them. However, some research indicated that attention should be paid to possible adverse effects, such as the increase in competition (Hamari, Koivisto, & Sarsa, 2014), an issue that we have already discussed earlier in Sect. 7.4.

Finally, it should be noted that, since gamification allows the game design elements to be combined in many different ways, the diversity of specific designs in the implementation of this technique makes it difficult to carry out a study on its effects in a generic way, without taking into account the combination of the elements that respond to the results obtained (Sailer et al., 2017).

7.6 Discussion and Conclusion

The incredible power of video games to captivate players, making them to spend hours repeating actions to move to the next level, promises to be useful for improving student engagement in solving classroom tasks. The study of the factors that give this feature to the games has led to the creation of different strategies for education.

One of them consists in generating dedicated video games, called Serious Games, which are specially designed and developed to achieve the learning of a subject or the development of some skills. The other strategy, called Gamification, consists in using the elements that were detected as the triggers of engagement in the games, and using them to make the students achieve small secondary objectives, until achieving the definite final objective, in a funny environment.

In both strategies, it is very important to amalgamate the intrinsic motivation given by the significance of the task to be performed with the external motivation given by the rewards that the game is delivering.

Although the use of serious games allows focusing on a particular knowledge acquisition or skill development, the required software for this must be developed or obtained, which can often be somewhat complicated. On the contrary, the gamification of a course, through the use of game strategies, is more accessible for professors.

Although this facility has led to increase in the number of gamification experiencies in many environments, it is worth mentioning that in education many cases are not really a topic gamification, but only decorated tasks obtained by adding budgets and leaderboards, which is far from being a gamification.

The correct gamification of a course or topic implies a careful design of mechanics and dynamics elements, which will stimulate the students by covering all possible motivations through an adequate balance. Different students will have different types of motivations. Some of them will enjoy developing creativity, others will be moved by the surprise factor and others will be motivated to obtain something that is exclusive or very difficult to achieve. If the used game strategy balances these factors and manages to give each one what really motivates them, the maximum potential in their learning will be obtained.

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