Gamification of
DIGITAL LEARNING

COMPENDIUM

Contents

CHAPTER 1. WHAT IS GAMIFICATION? INTRODUCTORY AND THEORETICAL BACKGROUNDS FOR GAMIFICATION

1.1. Theories currently used to explain Gamification in teaching and learning.

Definition of terminology used: digital games, gaming, Gamification.

- Meaning of Gamification (or Gamification of learning)
- Game-based Learning (GBL)
- Educational Games (or Edugames)
- Video-games

The literature review reveals an important observation: often, there is a confusion around the concepts and the differences used by the sources and the various terminology Game-Based Learning – Gamification – Games - Video Games.

It's important to understand the differences because the incorrect use of one instead of the other significantly affects the effectiveness of the learning path. A teacher might plan many activities for the Gamification of learning by introducing entertaining videogames in the lesson plan and not obtaining the expected learning outcomes.

Let's explore what each terminology means.

The **Gamification of learning** is a developing educational approach that seeks to motivate students and increase their engagement by using videogame design and game elements in learning environments (Dichev, C., Dicheva, D., 2017).

Gamification is not just a technology but also a methodology to increase motivation and engage learners in educational contexts.

In fact, the growing popularity of Gamification stems from the belief in its potential to foster motivation, behavioral changes, friendly competition, and collaboration in different contexts. Its main goal is to maximise the enjoyment and engagement of learners by capturing their interest and inspiring them to continue learning.

The term "**Gamification**" was first coined in 2002 by developer Nick Pelling as part of an in-game advertising start-up, while in 2008, Bret Terrill (Senior Director Corporate of Zynga, a gaming company) defined it as «taking the mechanics of games and applying them to other web properties to increase engagement». It was only in 2010 that the term "Gamification" entered the mainstream vocabulary. Since then it has been a teaching methodology accepted and appreciated all over the world, based on the **application of game mechanics and dynamics to non-game situations and in contexts that are not strictly playful such as education** (Innocenti, 2021).

This term has been defined in several ways, such as «the use of game design elements in non-game contexts» (Deterding, Dixon, Khaled, & Nacke, 2011), «the phenomenon of creating gameful experiences» (Hamari, Koivisto, & Sarsa, 2014), or «the process of making activities more game-like» (Werbach, 2014).
As pointed out in *Gamifying education: what is known, what is believed and what remains uncertain: a critical review* by Dichev and Dicheva, Gamification in education refers to the introduction of game design elements and gameful experiences in the design of learning processes. It has been adopted «to support learning in a variety of contexts and subject areas and to address related attitudes, activities, and behaviours, such as participatory approaches,

collaboration, self-guided study, completion of assignments, making assessments easier and more effective, integration of exploratory approaches to learning, and strengthening student creativity and retention» (Dichev, C., Dicheva, D., 2017).

Gamification in learning involves several aspects, including game elements, educational context, learning outcomes, learner profile, and the gamified environment.

Gamification is, therefore a constructivist model in which the student is placed at the centre of the educational process and builds his own self-motivated learning through direct experience that allows him to memorise notions and concepts longer-term and not just in relation to grades (Innocenti, 2021).

Based on the “customisation” (personalization) of the path, it is a learning process divided into consecutive phases, which gives particular emphasis to socialisation by eliminating the dualism between theory and practice. Educational Gamification proposes using game-like rule systems, player experiences, and cultural roles to shape learners’ behavior.

The rationality at the basis of gamifying learning is that adding elements, such as those found in games, to learning activities will create immersion in a way like what happens in games (Codish & Ravid, 2015). This leads to the belief that by incorporating game mechanics in the design of a learning process, learners can be engaged in a productive learning experience and, more generally, change their behaviour in a desirable way (Holman et al. 2013).

Transferring educational objectives into challenges on the model of games and videogames, with visibility of performance graphs, awarding of growth badges,

escape rooms, and rewards can increase, through competitiveness, the perception of the importance and significance of the task.
The potential of using game-like elements is to subvert the rules, proposing new ones, thus undermining the deleterious effects that - often - traditional education and training bring with them (AICA - Associazione Italiana per l'Informatica e il Calcolo Automatico, and Sle-L - Società Italiana di e-Learning, 2018). In fact, a game allows students to be firsthand protagonists, even more than traditional mediums.

Gamification can motivate students to engage in the classroom, give teachers better tools to guide and reward students and get students to bring their full selves to the pursuit of learning. It can «show them education can be a joyful experience, and the blurring of boundaries between informal and formal learning can inspire students to learn in lifewide, lifelong, and life deep ways» (Lee, J., Hammer, J., 2011).

The principle behind Gamification is very simple: having fun to get better results. Game elements motivate learning and allow for greater inclusion, creativity, and empathy.

Gamification should not be confused with "**Game-Based Learning**": while the latter develops learning through videogames in the strict sense, Gamification reproduces the dynamics of videogames but does not necessarily use them. This methodology does not transform didactics into a game but simply uses the tools of the game in didactics, incorporating game elements into non-game settings.
In **Game-Based Learning (GBL)**, educators use games to enhance the learning experience. When gaming is applied in the educational field for teaching purposes, it is generally called **edutainment**. They may use more **serious games**, meaning games designed to achieve specific learning outcomes and not

primarily to entertain, or **commercial games** designed to entertain but with some learning as an additional feature (School Education Gateway, 2019). The primary purpose of serious games is not entertainment, even though they use the enjoyment of the game as an indispensable tool for achieving educational and training objectives.

GBL is a didactical strategy that uses games to teach a specific content or achieve a specific learning outcome. Through the game, the student acquires, reinforces, or enriches their knowledge. The game itself trains the acquisition of knowledge: while playing, the student learns notions and concepts that are the object of the game (Volterrani, V., 2021). Game-based teaching uses disciplinary content and makes it challenging and fun. It uses the game to provoke immediate learning.

Briefly, GBL integrates playful activity with educational content, making the latter more accessible and fun. Game and training are, therefore the same things. The goal is to teach a skill or achieve a learning objective, supporting student growth and development (Trippetti, E., 2020). GBL allows learning by playing; has a short duration (from a few minutes to an hour); has a simple structure; is limited to single activities; can be linked to any discipline, using specific topics; can be analogue or digital; can also be integrated into a classic classroom structure; always has a winner who, in Digital GBL, is often single; is competitive and challenging (Volterrani, V., 2021).

On the contrary, Gamification is the application of game mechanisms in a non-game context to promote prosocial behaviours and guide complex learning outcomes through traditional tasks. It is a lesser-known methodology than GBL because it is challenging and structured and more suitable for older students who can use elaborate strategies. At school, a classroom is “gamified” by having

students work in cooperative groups, whose members have different “roles” and “powers” (Volterrani, V., 2021). Groups of students experience a gamified adventure, a mission that uses game strategies to accomplish academic tasks and reach a complex goal.

Gamification does not necessarily require the use of video games. It is possible to “gamify” the activities by simulating the mechanics and plots typical of game design. Videogames become tools with which to learn, for example, “serious” notions and skills (the serious games we mentioned above), which in fact is just a sub-category of Gamification.

In short, Gamification uses game mechanics in a non-game situation to induce learning and provoke positive group behaviours; integrates traditional learning objectives; promotes the acquisition of academic skills and the development of social-emotional skills; uses complex themes that are diluted, developed, and taken up in the gamified pathway; brings into the gamified path the content and related learning activities, often traditional, created by the teacher; has a long duration, even a few months, depending on the complexity of the theme, the intent of the teacher, and the age of the students involved; uses levels, progress badges, rewards, and experience points, which during the “gamified” activity replace grades; stimulates cooperation aimed at achieving a common goal; builds a new model of classroom and learning environment; it is engaging and challenging.

Therefore, understanding Gamification's role in education means understanding under what circumstances game elements can drive learning behaviour. Gamification can change the rules, but it can also affect students’ emotional experiences, sense of identity, and social positioning. Gamification projects offer

the opportunity to experiment with rules, emotions, and social roles (Lee, J., Hammer, J., 2011).

In *Gamification in Education: What, How, Why Bother?*, Joey Lee and Jessica Hammer underline three major areas in which Gamification can serve as an intervention: cognitive, emotional, and social (Lee, J., Hammer, J., 2011).
First, games provide complex systems of rules for players to explore through active experimentation and discovery. Also, games guide players through the mastery process, keep them engaged with potentially difficult tasks (Koster, 2004), and provide multiple routes to success, allowing students to choose their sub-goals within the larger task.

Second, games invoke a range of powerful emotions, from curiosity to frustration to joy (Lazarro, 2004). Games maintain this positive relationship with failure by making feedback cycles rapid and keeping the stakes low.
«Gamification offers the promise of resilience in the face of failure by reframing failure as a necessary part of learning. Gamification can shorten feedback cycles, give learners low-stakes ways to assess their capabilities, and create an environment in which effort, not mastery, is rewarded» (Lee, J., Hammer, J., 2011). Students can learn to see failure as an opportunity instead of becoming fearful or overwhelmed.

Finally, game-like elements allow players to try on new identities and roles, and they can also provide social credibility and recognition for academic achievements, which might otherwise remain invisible or even be denigrated by other students. The teacher can provide recognition, but Gamification can also allow students to reward each other with in-game currency.

Gamification and Game-Based Learning: an overview

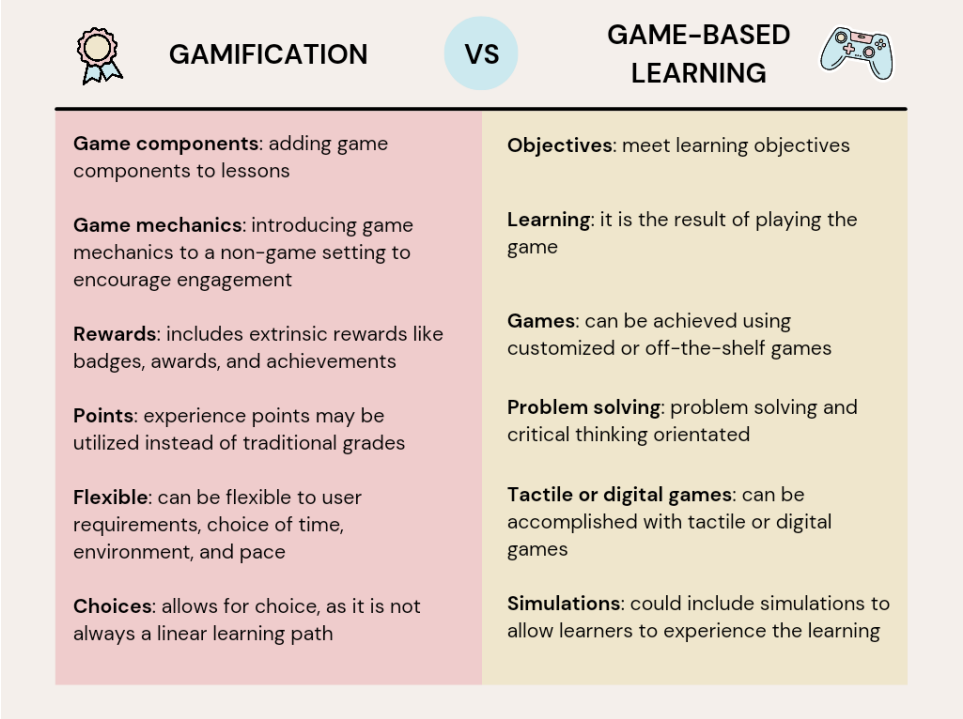

Fig. 1: Gamification and Game-Based Learning in brief.

Source: Game2Change Learning, "Gamification in Learning", https://game2change.com/2022/04/20/gamification-in-learning/

1.2. Gamification in education

As already observed, **Gamification** is the use of game design elements in non-game contexts. Game design elements used in creating Gamification scenarios can be divided into three categories: dynamics, mechanics, and components (Werbach & Hunter, 2012).

Dynamics represents the highest conceptual level in a gamified system. It includes constraints, emotions, narrative, progression, and relationships. **Mechanics** are a set of rules that dictate the outcome of interactions within the system, while dynamics are users' responses to collections of those mechanics. The game mechanics refer to the elements that move the action forward. They include challenges, chance, competition, cooperation, feedback, resource acquisition, and rewards.

Components are at the basic level of the Gamification process and encompass specific instances of mechanics and dynamics. They include achievements, avatars, badges, collections, content unlocking, gifting, leaderboards, levels, points, virtual goods, etc. For instance, points (components) provide rewards (mechanics) and create a sense of progression (dynamics).
If a teacher "gamifies", it does not mean that she/he has to use or create a video game but that they design the learning path within the lesson dynamics or mechanism, which are similar to games.

Instead, in *Game-Based Learning,* the teacher uses a game (can be digital or not digital) to teach content; the game, therefore might exist already, and it's suitable to achieve one or more didactic/learning objectives.

Educational Games are video games explicitly designed to achieve educational goals.

The main elements of Gamification in class are:

- involvement
- feedback
- risk related to certain actions
- setting up point systems

It's important to make a distinction between a "playful objective" (reached on completion of a "mission") and a "didactic objective" (learning objective), that is what the student will know and/or will be able to do at the end of the "gamified" teaching experience.

It is also important to point out that a common mistake is to view Gamification as an educational strategy composed exclusively of scores and a sense of competition. There are many more practices and tools that ignite a close relationship between gaming and the human mind.

In fact, according to Yu-kai Chou there are **8 principles**, **defined as core drives of Gamification** (AICA - Associazione Italiana per l'Informatica ed il Calcolo Automatico, and SIe-L - Società Italiana di e-Learning, 2018):

1) epic meaning & calling, concerning, for example, completing a mission alone or in a group;

2) development & accomplishment, through progress, developing skills, conquering and overcoming challenges, gaining points, badges, credits, bonuses, etc.;

3) empowerment of creativity & feedback;

4) ownership & possession;

5) social pressure & relatedness, through challenges, bonus exchanges, and requests for help;
6) scarcity & impatience, through certain mechanisms such as countdown, time-on-task, etc.;
7) unpredictability & curiosity;
8) loss & avoidance.

The challenge education faces today could include exploiting these principles (without necessarily following all of them) to engage learners, stimulate their interests and get their attention.

There are several types of games and Gamification strategies (Nieto-Escamez, F.A., Roldán-Tapia, M.D., 2021). One of the simplest ways to gamify teaching is using quizzes, allowing students to test their knowledge on different platforms, such as web-based quizzes or apps.

Additionally, different strategies have been employed: the challenge-the immersion-and the social-based Gamification. The first strategy is based on overcoming challenges. The second model attempts to immerse the user into a story and is characterised by its audiovisual richness. Finally, social-based games permit to develop strategies of competition and collaboration.

As repeatedly emphasised, employing Gamification in learning environments **enhances students' motivation**, **encourages social interaction**, and **maximizes enjoyment and engagement** while providing social links, promoting knowledge seeking, and developing creativity.

Gamified activities have been linked to enhancing students' intrinsic and extrinsic motivation.

First, Gamification enables three basic psychological needs to be satisfied: **autonomy, relationship, and competence** (always at least one of them). Second, requiring a challenge, an indication of progress, some feedback, levels of achievement, etc., Gamification permits to stimulate and improve students' performance (through their commitment toward the goal, the feedback they receive, the complexity of the activity, and the situational constraints). Finally, Gamification requires specific and understandable goals, immediate feedback, achievement indicators, and an adequate balance between challenges, student skills, and the perceived value of the activity. Creating an optimal psychophysical state maximises both entertainment and commitment of students.

When teachers select their tools for designing digital classes, they should not fill in their hour of lesson with highly ranked video games but use tools that influence the involvement of the children (learners) through a learning path that touches emotions. The teacher has to create stimulating and exciting experiences, which might also mean using tools they already are using.

1.3. Benefits of Gamification in digital learning

a. For students (common students, students with specific learning disorders)

A gamified environment may help nurture the shaky self-confidence of learners with Specific Learning Disorders (SLDs) because Gamification allows students to understand that failure is a part of the learning process just as it is in the gaming context, as long as the learner continues trying to improve and succeed. The effort should be encouraged instead of achievement only (Lee, & Hammer, 2011).

One of the most important aspects of Gamification is that it is highly customisable. The customisation aspect of Gamification can help students with SLD by adapting the material backgrounds, fonts and others according to the users' needs.

Gamification can be an accessible and affordable method for supporting and motivating students with learning disorders, especially because it provides instant and constant feedback, which is very important for learners with SLD. However, if the Gamification parameters are too complex, there can be some drawbacks concerning cognitive load, meaning that there is an overload of information in the working memory exceeding its capacity, especially because learners with SLD often have working memory deficits, and it is important to reduce the memorisation efforts.

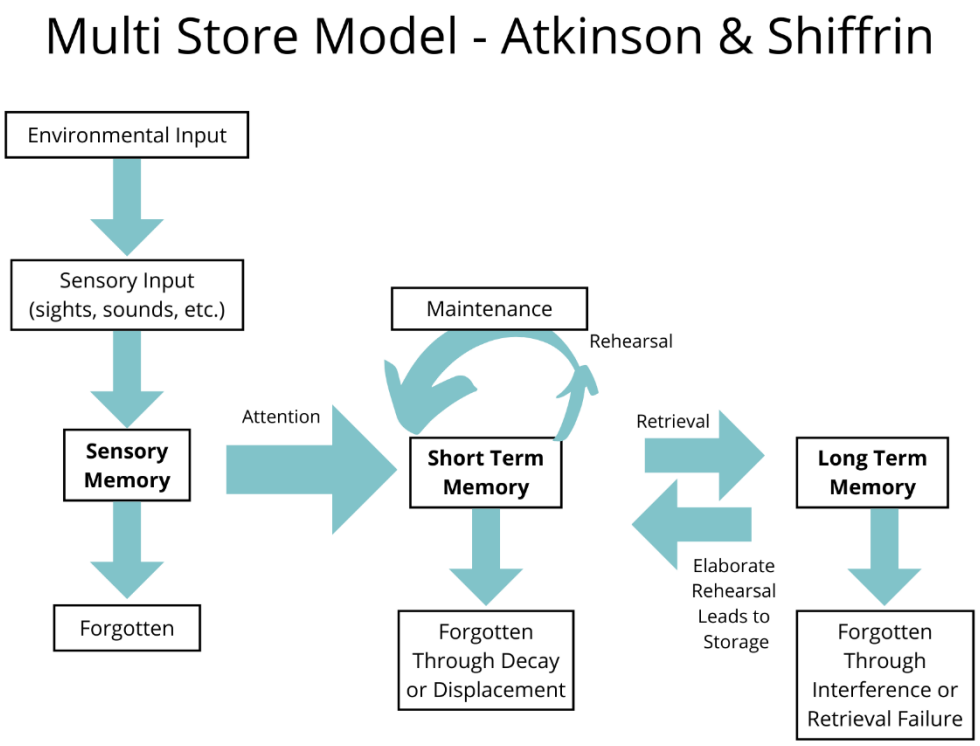

Fig. 2: Multi-Store Model – Atkinson & Shiffrin

Source: Adapted from Atkinson, R.C. and Shiffrin, R.M. (1968). 'Human memory: A Proposed System and its Control Processes. In Spence, K.W. and Spence, J.T. The psychology of learning and motivation, (Volume 2). New York: Academic Press. pp. 89–195.

Fortunately, the significant customisation possibilities of Gamification can help bypass the cognitive load issue. Teachers can create activities with instructions broken down into small steps and with repetition, which allows the learner to apprehend and maintain information going from the short-term memory and reaching the long-term memory. Therefore, the role of repetition is quite important for consolidating information in the long-term memory.

b. For teachers

Integrating game elements into education brings benefits to both students and teachers.

Teachers are stimulated by a **new way of teaching,** and lesson preparation with these new innovative teaching models can be a source of fun not only for students but for the teachers themselves.

The interactive nature inherent to Gamification is determinant in capturing students' attention in the learning process. Thanks to Gamification, teachers **increase the level of involvement** in classrooms, stimulating their participation and learning.

Another important aspect is that Gamification allows teachers to prepare for **personalized learning**. Education has to be personalised and not standardised: all students are different, and it is necessary to adapt the teaching process to them to find their talents and cultivate them according to their time based on their goals.

This doesn't mean that every lesson has to be specifically designed around every individual student. Still, it means that students need to be able to see how the learning is relevant and meaningful to their own lives. Also, differentiation doesn't necessarily mean giving every student something different to do and study, but it means that teachers can use different strategies to ensure that every student can access their learning at a level and in a mode that fits their needs.

Personalising learning means adapting it to the individual characteristics, timing, and subjective motivations of students. The curricular program divided into sub-steps would give every student the best tools to progress from level to level with the goal of stimulating understanding of processes to solve problems concretely.

Teachers can tailor lesson plans to individual students also thank the fact that they have access to real-time data showing how each student is working and whether they are achieving their objectives. This allows the teacher to pinpoint precisely who needs intervention, whether to reinforce the learning or build an additional challenge.

In fact, Gamification gives teachers better tools to guide and reward students, allowing **easier monitoring** of their performance and progress. Feedback plays an important role in effective learning, and in this way, teachers can provide students with curriculum-aligned feedback to drive their learning further, and also their peers can give them feedback with likes and comments.

c. Limitations and drawbacks of Gamification practices.

There are four critical issues regarding Gamification (Innocenti, 2021):

1. Gamification might absorb teacher resources because of the re-thinking of lesson structure and the bigger preparation of lessons.

Teachers need to rethink the structure of their lessons to adapt and incorporate the elements of Gamification into them. In addition, teachers need to train themselves on how best to use these different elements, and which existing platforms are most appropriate to use, how, and why.

2. It is based on extrinsic rewards that are only worthwhile in the short term, while intrinsic motivations are best suited to learning.

In fact, in Gamification, motivation is essentially based on extrinsic rewards, which are the least effective in the long term. The least motivated learners are those who base learning on the expectation of external rewards and not on pure interest, on the love of knowledge for its own sake.

3. The visibility of the score rather than motivation may create performance anxiety in some learners.

The score and points in Gamification could induce students to compete negatively, generating deep sadness because of an unreal ideal of perfectionism. Performance would become a ranking, and not only an opportunity for improvement and personal growth.

Moreover, Gamification might teach students that they should learn only when provided with external rewards.

4. The Gamification methodology may not be able to fully cover the demands and objectives of the school curriculum.

Gamification could be a tool to train specific skills, a complementary training to didactics, that cannot replace the teacher or substitute teacher's charisma, the only guarantee against school drop-out and adolescent apathy.

CHAPTER 2. CURRENT METHODOLOGIES AND STRATEGIES USED TO APPLY GAMIFICATION IN DIGITAL LEARNING IN INTERNATIONAL LITERATURE

2.1. Methods and strategies of using Gamification in digital classes

This chapter will focus on analysing the development and introduction of Gamification in eLearning, especially on how it unfolds as a tool to motivate and engage learners. Also, the sustainability of Gamification methods and strategies in eLearning context with different Gamification design elements is important to explore in the literature review. It is meaningful to dive into the existing approaches as well as the experts' experience with Gamification in the digital context.

Gamification of learning is not a new concept; it has been used in education for a long time, with the term emerging in the early 2000s and the focus on it has strongly increased since the 2010's (Sailer, Hense, Mayr, & Mandl, 2017). However, the necessity of developing Gamification methods became more evident with the Covid19 pandemic, when classes were mainly offered online. This sudden shift left educators unprepared for this new way of teaching, causing difficulties for both educators and learners to adapt to the emergency eLearning context.

Gamification can help redress current flows in education, especially in a digital contexta , by using game-like methods in the classroom. Gamification per se is not effective, but the different configurations and design elements give an added value in terms of motivation and change in terms of the way learners work. (Sailer, Hense, Mayr, & Mandl, 2017).

Game design elements

Grading can be inspired by gaming characteristics where progress motivates people to advance further in the game. Instead of counting down, counting up can be highly motivational for students, like in a game context.

Strategies surrounding **leaderboards** and their role as motivation tools are worth exploring since their potential can be mixed. The main question is, what are leaderboards, and how can they potentially motivate learning? It is important to note that leaderboards must be well conceived to have the desired effect of motivating learners. A leaderboard is simply a score list measuring their achievement against certain criteria being useful to identify the top performances within certain activities used as a competition indicator. According to the article: "The Psychology of Competition: A Social Comparison Perspective"

from the journal Perspectives on Psychological Science; competition is present everywhere and there is a basic drive that propels individuals into performance improvement based on social comparison with a push to do better (Garcia, Tor, & Schiff, 2013). The intrinsic motivation value of the leaderboard cannot be underestimated; it can improve the feelings of self-worth and self-actualisation. This motivation comes from within, from the completion of certain tasks and from the accomplishment of challenges, in this case, no external motivation is needed. Leaderboards can have important drawbacks if not appropriately conceived and depending on the target audience. If learners find themselves on the bottom of the leaderboard, it can have the opposite effect being quite demotivating however, if learners are more or less at the same level, the positive effects are more likely to help boost engagement through social pressure (Sailer, Hense, Mayr, & Mandl, 2017). If competition among peers seem to be very anxiolytic in a certain context, it is possible to establish competition against the previous self, meaning that the learner seeks to improve their own scores, putting the learner against their own previous scores.

Learners who lack intrinsic motivation can find that motivation with the use of **experience points** and **badges**. A well-structured point system is a successful way of rewarding accomplishments and performances, while badges can be a complimentary design to this system of rewards. Badges can be complimentary by marking the levels of activities and rewarding learners by performance and acquired skills. Badges can be earned and accumulated throughout gamified activities, and even thou they have no value or meaning, they can influence the learners' behaviours and engagement triggered by social influence (Sailer, Hense, Mayr, & Mandl, 2017).

Gamified pedagogical material carries a lot of possibilities in terms of **customisation** compared to traditional pedagogical materials. Customisation can be a source of motivation for learners. Being able to choose their own background, avatars, font, and others is an added value. The idea that they are leading and choosing their educational path gives learners a sense of agency. It also can render the material inclusive since learners can choose aspects that make them feel more comfortable.

The main drawback of gamified activities in digital learning is the absorption of educators' time. To have gamified elements with efficient results embedded in lesson plans, educators have to ponder on the design elements that can contribute to their goals, besides the research time to find out what is already available to facilitate the creation of gamified lesson plans.
Another important drawback is that if Gamification becomes compulsory, it can be, as stated by the article 'Gamification in Education: What, How, Why Bother?", "a chocolate-covered broccoli", appearing at first glance as something pleasant but turning into a burden fast. Therefore, not all Gamification strategies work and the key lies in the game-like elements that are applied in the education context.

Gamification can be suitable for all moments of need, which are:

1. "When people are learning how to do something for the first time (**New**);
2. When people are expanding the breadth and depth of what they have learned (**More**);
3. When they need to act upon what they have learned, which includes planning what they will do, remembering what they may have forgotten, or adapting their performance to a unique situation (**Apply**);

4. When problems arise, or things break or don't work the way they were intended (**Solve**); and,
5. When people need to learn a new way of doing something, which requires them to change skills that are deeply ingrained in their performance practices (**Change**)." (Written by Bob Mosher & Conrad Gottfredson in Learning Solutions, 2012).

Although Gamification is applicable to all 5 moments of need, some element designs of Gamification are not, such as competition, which is only suitable for moments where learners are well-prepared and have had a chance to learn (1 New) and expand their knowledge (2 More), according to the article "The Psychology of Competition: A Social Comparison Perspective" in the journal of Perspective on Psychology Science (Garcia, Tor, & Schiff, 2013).

2.2. Digital Classroom activities through Gamification

According to Bob Mosher and Conrad Gottfredson, you cannot expect that the new learned subject will magically transform into expertise or high performance unless the educator puts in place strategies in place to support performance (Mosher & Gottfredson, 2012). For this reason, lesson plans integrating Gamification can be highly effective in supporting learning, practice, problem-solving and more. Bringing game elements to a non-gaming situation opens the possibility for different types of activities to deliver lesson plans for online class contexts in an engaging way.

a. Examples of class activities in digital teaching and learning

Trivia can be introduced in the classroom in a fun and engaging way, where students can compete in teams to learn a particular subject, it can help develop skills such as working in a team, fast-thinking and strategising, without the pressure of failing because of the context. Trivia can also be set up as a game show like Jeopardy, for instance; changing format allow students to choose categories based on the subjects being currently taught. Trivia can be introduced as a form of incentive after a complex and information dense lesson in order to decompress and reinforce learning at the same time. Trivia can also be used to celebrate a class's milestones, while reinforcing knowledge learned for a certain period of time, bringing a chapter to a closure with a fun and joyful activity. Trivia can supplement a lesson plan and educators can make use of existing tools and apps to simplify their task. With trivia the power of intrinsic motivation is high because of the playful context, but, if educators choose to, they can also use extrinsic motivation on some occasions such as badges or small prizes.

Riddles and **puzzles** are excellent brain teaser tools. They can serve as a base for several types of activities or can be used sporadically throughout lessons to engage learners and regain their attention. While a riddle is a type of puzzle, it is delivered in a specific way creating an enigma, a mystery. This format is ideal to create escape games which is in rise in education, especially in the digital format. Escape rooms provide an activity where learners can get away from a routine while solving riddles, working in teams or individually, reflecting and anticipating challenges and working on problem-solving skills. Escape rooms offer an interactive type of learning that can be easily introduced in a lesson plan thanks to the existence of several supporting tools to create these escape games such as Genially for example.

Puzzles in general offer vast opportunities to create gamified content in a digital learning environment. The most common type of puzzle is crosswords and they are still very much relevant today. Crosswords can be done individually but also in small groups to work on language and memory skills. They can be designed in a way that is not frustrating for the learner, giving clues or multiple choice for instance. Educators can also create a scavenger hunt using online resources that can be useful for the lesson, the educator can give clear guidelines and let the learners find the information on the internet. Hiding pieces of a puzzle in the course module can be a strategy to ensure that learners cover the entire material and find the puzzle pieces in the meantime, increasing the attention and interest in the reading materials provided by the educators.

Bingos are, like crosswords, another common format that can be used in a digital classroom to gamify general learning materials. Educators can for instance read the definition of a word and the student has to find the word in the bingo sheet, or use it for mathematics using fractions and calling out the decimal numbers. Within the mathematics subject, educators can use random representations such as a **slot machine** in order to teach probability and allow the learner to make experiments and exercises.

There are several possibilities of class activities that can be applied to the digital classroom context in order to avoid boredom and online learning fatigue. These activities allow the learners the regain motivation and engage with the content in a more active way. As these activities are highly adaptable and customizable the educator can provide accommodation to the type of learner they have, as different aspects of Gamification affect motivation differently.

b. Inclusive learning through Gamification

Students facing learning disorders often tend to have difficulty finding motivation and self-confidence. Therefore, Gamification can help inclusion due to its motivational aspect (Gooch, Vasalou, Benton, & Khaled, 2016).

The intrinsic and extrinsic motivation aspects of Gamification can be tailored to suit the needs of learners with learning disorders. Gamification can be used to boost intrinsic motivation by replenishing the sense of self-confidence and self-actualization just by simply making learners happy to be part of the activity despite the lack of extrinsic motivation. In some cases, both types of motivation are incorporated in the Gamification design in order to regain self-confidence lost by learners with SLD. While extrinsic motivation alone is often seen as a less desirable choice, the article "Intrinsic and extrinsic motivations: Classic definitions and new directions" states that: "students can perform extrinsically motivated actions with resentment, resistance, and disinterest or, alternatively, with an attitude of willingness that reflects an inner acceptance of the value or utility of a task... in the latter case, the extrinsic goal is self-endorsed and thus adopted with a sense of volition" (Ryan, & Deci, 2000, 25(1), 54-67). Therefore, in this case the learner has to understand the value of the gamified activity and be willing to participate.

When Gamification is engineered, it can be adapted to be inclusive to all, besides Gamification can be applicable to a variety of contexts, formats and environments. In video games the players feel like they can fail a level and try over and over again until they succeed. For this reason, bringing game like characteristics to the learning context can be beneficial to support learner with SLD that have faced challenges in their learning career due to their difficulties, thus taking the edge off. Also, another important aspect to consider is that in a

game-like activity gamers can choose to play in a superior level or not: this characteristic can greatly benefit students with SLD, this can be a strategy applied to subject revision using Gamification to allow learners to identify when they are ready to move on and engage in a more complicated subject. Giving the learner the possibility to decide when they desire to increase the difficulty level gives them more confidence which is an important aspect to foster in students with special needs.

Social competition can be optional according to the classroom needs, while it can be anxiolytic for some it is motivational for others. While working with learners with SLD it is important to consider some general points of attention, for instance:

- Learners with SLD often need more time to accomplish tasks than their peers, so when creating a time-sensitive gamified activity, it is important to consider the extra time needed.

- While explicit instructions are desirable in any context, it is even more important when working with learners with SLD, it is important to split instructions in small steps with precise instructions.

- Before designing gamified activities, it is important to acknowledge that in some contexts, competition-based activities can be harmful or beneficial depending on the learners' needs, the educator in this case must be aware if competition will be an added value for the lesson.

- Finally, avoiding too much information or very complex activities is desirable for all learners' profiles but it is especially important for learners

with special needs in order to avoid a cognitive load that will impeach their participation in an enjoyable way.

Gamification allows for matching the psychological and pedagogical needs of learners through game design elements. The different design elements make Gamification highly customizable to allow participation from learners with special needs.

CHAPTER 3. THE EXPERTISE OF TEACHERS EDUCATORS, AND SPECIALISTS ON THE SAME TOPIC OF GAMIFICATION, AT LOCAL LEVEL

3.1. Interviews and questionnaires with teachers, educators, and specialists on the topic of Gamification – Results for five countries.

The project partners developed a questionnaire with the main objective to assess the extent to which educators, teachers, experts and students are familiar with Gamification in digital learning and to help the project partnership understand the needs and challenges of Gamification.

The questionnaire consists of **eight multiple-choice** and **three open-ended** questions.

Participating Organizations:

- **SCS Logopsycom – 18 respondents**
- **Euphoria Net Srl – 7 respondents**
- **Colegiul Tehnic Mihai Bacescu – 10 respondents**
- **IMS Private School – 10 respondents**
- **Technikum Informatyki Edukacji Innowacyjnej – 14 respondents**

Questions

1. **In this demanding Covid-19 period, did you use interactive methods in your online teaching/learning activities?**

Out of ten educators interviewed at the **Colegiul Tehnic Mihai Bacescu** in **Romania**, seven of them confirmed that they used interactive methods in learning most of the time. The remaining three stated that they did so some of the time. Of the eighteen teachers and experts interviewed by **Logopsycom** in **Belgium**, most (seven to be exact) reported using interactive methods most of the time. Five said having done so some of the time, four seldom, and the remaining two never. Instead, **Euphoria Net** interviewed seven teachers from five different schools in **Italy** (in Campania, Lazio and Lombardia). More than half (four) stated that they used interactive methods most of the time. The remaining three some of the time. Of the ten educators interviewed in **Cyprus** at the **IMS Private School**, seven responded most of the time. The remaining three, some of the time. Finally, of the fourteen teachers interviewed at **Technikum Informatyki Edukacji Innowacyjnej** in **Poland**, eight stated that they used these methods most of the time, five some of the time. The last remaining one, seldom.

The analysis of the various answers allows us to state almost unanimous feedback on the use of interactive methods as a learning strategy since most of the teachers or educators interviewed in each country answered that they used them **most of the time** (33 out of 59, leading to 55%).

2. **To what extent were your students motivated by online learning?**

Six out of ten school educators in **Romania** stated that their students are somewhat motivated by online learning. The remaining four responded that

they are motivated to a large extent. Six of the teachers interviewed by **Logopsycom** in **Belgium** stated that their students are motivated to a large extent by online learning. Similarly, six others replied that they are somewhat. Another four noted that the pupils are very little motivated. The remaining two, however, are not at all. Of the seven teachers interviewed by **Euphoria Net** in **Italy**, five answered that their students are somewhat motivated by online learning. The remaining two stated that their students are to a large extent motivated. Out of ten responses by educators of **IMS Private School**, two answered to a large extent, six answered somewhat, and two very little. Finally, in **Poland**, six of the fourteen teachers interviewed stated that their students were somewhat motivated by online learning. Five answered very little. Two responded to a large extent. The last one stated not at all.

From the analysis of the results obtained, it can be stated that the most common response from most teachers/educators is that their pupils are **somewhat** motivated by online learning (29 respondents on an aggregate level). On the other hand, the remaining part was divided among several answers depending on the sample taken into consideration.

3. **To what extent did the interactive methods used in online teaching/learning activities motivate the students with special needs?**

Of the ten teachers interviewed in **Romania**, four responded to a large extent. Another four answered somewhat. The remaining two responded very little. Of the eighteen teachers interviewed by **Logopsycom**, eight responded that students with special needs are somewhat motivated by interactive methods in online learning. Five stated very little. Three responded to a large extent. The remaining two answered not at all. In **Italy**, on the other hand, 57% of the

teachers interviewed (four out of seven) stated that students with special needs are somewhat motivated by this use. Two said to a large extent. The last, however, very little. Of the ten responses teachers gave at the IMS Private School in **Cyprus**, two answered to a large extent, four answered somewhat, one answered very little, and three did not answer. Finally, seven of the fourteen teachers interviewed in **Poland** stated that their students with special needs are somewhat motivated. Five responded to a large extent. Two answered not at all.

Again, from the analysis of the observed data, it can be deduced that the most common response given by teachers/educators in the various countries was **somewhat** (27 out of 59).

4. **Are you familiarized with Gamification methods in your digital classroom practices?**

At Romania's Mihai Băcescu Technical College, five of the ten interviewed teachers responded slightly familiarized with Gamification methods. Another three replied that they were familiar. The remaining two replied very familiarised and not familiarised, respectively. Five of the eighteen teachers/experts interviewed by **Logopsycom** in **Belgium** stated that they were slightly familiar. Another five indicated that they were familiar. Four answered very familiar. The remaining four are not familiar.

In **Italy**, five out of seven teachers responded as slightly familiar. The other two were respectively familiar and not familiar. Of the ten teachers interviewed at the **IMS Private School,** one responded very familiar. Eight answered familiarised. And the last answered not familiarised. In conclusion, out of fourteen teachers in Poland, six replied that they were familiarized with Gamification methods. Four stated that they were slightly familiarised. Three responded not familiarised. The last answered very familiarised.

From the data mentioned above analysis, it can be stated that most teachers are **familiar/slightly familiar** (19 out of 59) with the use of Gamification tools as a digital learning technique. On the other hand, a relatively conspicuous proportion of teachers interviewed in Belgium, Romania and Italy stated that they were **not familiarized** (10 respondents on an aggregate level).

5. **Are you willing to incorporate Gamification methods in your digital classroom practices?**

In **Romania**, six out of ten teachers interviewed stated that they would probably be willing to incorporate Gamification into their digital classroom practices. The remaining four indicated that they were definitely willing. In **Belgium**, fourteen out of eighteen teachers/experts stated that they were definitely ready to integrate Gamification. The remaining four answered probably. Of the seven teachers interviewed in **Italy**, three answered definitely. The remaining four answered probably and possibly, respectively. Of the ten answers given in **Cyprus**, seven answered definitely, and three responded probably. Finally, seven of the fourteen teachers interviewed in Poland stated that they were definitely willing. Five replied that they were possibly. The last two to be probably.

The response given by most teachers/educators in **Belgium, Italy, Cyprus and Poland** is that they **are definitely willing** to introduce Gamification tools into their digital teaching practices (37 out of 59 respondents). In **Romania**, on the other hand, it was the second response given after **probably**.

6. **Do you think that Gamification methods in learning will be an important asset for your online classes?**

Six out of ten teachers in **Romania** responded that they strongly agreed. The remaining four agreed. Of eighteen teachers/experts interviewed by **Logopsycom**, twelve stated strongly agree. Four responded agree. The remaining three answered neutral. Four out of seven teachers interviewed in **Italy** by **Euphoria Net** replied that they agreed that introducing Gamification in learning is an essential asset for online classes. Two answered strongly agree. The last was declared to be neutral. Of ten answers teachers gave at the **IMS Private School** in **Cyprus**, seven responded strongly agree. Three responded to agree. In **Poland**, on the other hand, eight out of fourteen teachers replied that they agreed. Three stated they were neutral. Two stated that they strongly agree. The last answered disagree.

From the analysis of the data, it is possible to state that in **Romania, Belgium and Cyprus**, most teachers/educators **strongly agree** that introducing gamified tools can be an essential asset in the online classroom. In **Italy and Poland**, the most common response was **agreed**. In **Poland**, a small part (one in fourteen teachers) stated that they **disagreed**.

7. **Do you think that Gamification can make the learning process easier and more attractive for the students?**

In **Romania**, six out of ten teachers interviewed strongly agreed that Gamification can make the learning process easier for students. The remaining four responded that they agreed. Of the eighteen teachers/experts interviewed by **Logopsycom**, thirteen stated strongly agree. Four answered that they agreed. The remaining three said they were neutral. In **Italy**, three out of seven responses strongly agreed. The remaining four agree and neutral, respectively.

In **Cyprus**, six out of ten teachers answered that they strongly agree. Three stated that they were agree. The last one is to be neutral. Finally, eight out of fourteen teachers in **Poland** indicated that they agreed. Four said they were neutral. The remaining two strongly agreed.

From the data analysis above, it can be deduced that most educators/teachers in the countries surveyed **strongly agree** that Gamification can make the learning process easier and more attractive for students. The only different figure is found in **Poland**, where four out of fourteen teachers stated that they were **neutral** to such an introduction.

8. **If bringing game principles and elements to a non-game context, such as learning, could it be a more stimulating way to teach a particular skill?**

All responded positively of the ten educators interviewed at the **Colegiul Tehnic Mihai Bacescu** in **Romania**. The same was true for the eighteen teachers and experts interviewed by **Logopsycom** in **Belgium.** In **Italy**, six out of seven teachers answered yes. In **Cyprus**, out of ten respondents, ten answered yes. Finally, eleven responded positively out of fourteen teachers interviewed at the **Technikum Informatyki Edukacji Innowacyjnej** in **Poland**. The remaining three answered no.

From an analysis of the above data, it can be deduced that, except for a small part in **Italy** and **Poland**, most teachers and educators (93% of respondents, 55 teacher out of the 59 interviewed) **agree** that using game elements in non-game contexts could be challenging to teach a particular skill.

9. **If the answer is "yes", which skills can be enhanced using Gamification?**

In **Romania**, all ten educators interviewed agreed that several skills can be improved by using Gamification, such as problem-solving, creativity, teamwork, and critical observation. One out of ten teachers answered that it could help improve the basic skills used in teaching: reading, writing, listening and speaking. The eighteen teachers and experts interviewed in **Belgium** gave the following answers: motivation (three out of eighteen), grammar and writing (two out of eighteen), fixing learning, memorization, and all skills taught, especially those requiring restitution. Gamification helps improve communication, cooperation, teamwork, and understanding for teachers interviewed by **Euphoria Net** in **Italy**. Five out of ten **IMS Private School** teachers in **Cyprus** responded teamwork (five out of ten), problem-solving (three out of ten), communication (three out of ten), collaboration, engagement, speaking skills, motivation, and strategy. Out of fourteen teachers interviewed in **Poland**, three agreed that Gamification helps stimulate student motivation to achieve specific goals. Other responses were perceptiveness (two out of fourteen), problem-solving, teamwork, visual memory, concentration, and commitment.

10. **Do you use Gamification tools in digital classroom? How do you use them, and which ones are the most engaging for your students?**

Six of the teachers interviewed in **Romania** responded positively. They admitted that they used some Gamification tools (badges, challenges) to stimulate competition productively. Two out of nine respondents agreed on using Duolingo and Padlet for language learning and more complete tasks such as projects and reports. Two out of nine teachers used Kahoot to motivate students. In **Belgium**, three out of eighteen teachers responded that they use

Kahoot to review grammar and vocabulary. Three teachers replied that they use Genially. Other answers were Quizlet, escape games, blooket, online quizzes, Lumio. In **Italy**, five out of seven teachers answered that they do not use Gamification tools in the classroom. The remaining two replied that they used them during English lessons and used Genially, Kahoot, Padlet, and storytelling programmes. Six out of nine answers given by teachers from the **IMS Private School** in **Cyprus** admitted to using them even if not very frequently. Most of them use **Kahoot** to test their knowledge of what has been learnt in the classroom. One teacher replied that they use google classroom to assign daily and weekly tasks and give students instant feedback. On the other hand, the educators interviewed in Poland (eight out of fourteen answers) responded differently regarding the use of Gamification tools; quizzes, online quizzes, reward and pawn systems, simulations, puns, crosswords, and timed tests.

11. What are the benefits and the barriers of Gamification in digital learning?

At the **Colegiul Tehnic Mihai Bacescu** in **Romania**, seven out of nine teachers agreed that the benefits of Gamification include making lessons more exciting and stimulating for students' attention. Other answers were: objectivity in evaluating results, communication and teamwork are encouraged. Regarding the barriers that Gamification poses to digital learning, six out of nine respondents agreed on technical problems it brings, such as that some children do not have access to a good Internet connection. One out of nine teachers responded that Gamification could sometimes distract students. Four out of eighteen teachers/experts interviewed by **Logopsycom** in **Belgium** listed only benefits. In general, the answers agreed that students are more motivated. Eight out of eighteen teachers recorded only obstacles to the introduction of

Gamification in digital learning. In particular, the slow progress and preparation of the programme, lack of material and training. Three out of eighteen teachers responded by listing both benefits and disadvantages. They both recognized the increase in students' motivation but, at the same time, the slowness in preparation and the fact that some apps are paid for. Three out of seven teachers interviewed in **Italy** by **Euphoria.Net** listed only benefits, agreeing that Gamification increases student motivation. Two out of seven teachers recorded only disadvantages, such as distraction and lack of preparation in adapting traditional learning tools. The remaining two listed both advantages and disadvantages, such as making learning more fun through gaming, but also how there is a lack of digitization in schools. At the **IMS Private School** in **Cyprus**, two out of eight responses favoured the fact that Gamification makes teaching more interesting for students. The remaining reactions listed both benefits and obstacles. Among the benefits, it was recognized that Gamification is an alternative method of presenting material in a way that can be more interesting than traditional methods. It promotes collaboration among students and increases attention. At the same time, among the obstacles, it was recognized that it could lead to distraction and a lack of resources and preparation in using it. Concerning the teachers interviewed in **Poland**, twelve out of fourteen respondents listed the various benefits of introducing Gamification into digital learning, such as increasing students' awareness of their skills, stimulating creativity, cooperation, and familiarisation with new technologies. Five respondents listed, on the other hand, barriers; fear of novelty, lack of appropriate tools (lack of accessibility), lack of preparation, and a small number of games related to a particular subject in the digital space.

Conclusions

The irruption of the digital world into almost all areas of human life is forcing people to look for solutions that allow humans to adapt quickly to the changing

world, and the use of game mechanisms can significantly facilitate this process. Furthermore, due to the situation of Covid-19 and the introduction of an online learning system in schools, the need to motivate students to learn using digital tools emerged.

From the analysis of the above data, it can be deduced that the majority of the teachers, educators and experts interviewed in the various schools in the countries concerned are in favour of introducing Gamification elements into the learning process, and how this introduction is considered an essential asset for the online classroom. Despite the highlighted barriers to Gamification in digital learning (lack of material and training, the fact that it can cause distraction in pupils, and lack of accessibility), most of the individuals interviewed agreed that Gamification is a helpful learning tool that fosters problem-solving, concentration, creativity, communication and teamwork.

3.2. A short introduction to the available online resources, tools and software to be used for Gamification in digital learning

There are numerous digital platforms and online tools that can be used by teachers to gamify their lessons.
Surfing the internet, many hits propose the “top ten list” of the most popular tools available. The choice is huge, especially after online teaching became a powerful teaching strategy.
But which tool is the right one? Is there a right tool or software to gamify a lesson or an activity?
Teachers need to be able to understand which ones are most suitable, applicable, and useful for their own teaching path, based on the target audience, topics, objectives, etc.

Understanding learners, their background, and their current understanding of the topic that will be taught are important to ensure the effectiveness of the contents created.

There are different aspects that teachers need to consider while creating a gamified lesson:

- a **compelling narrative** to draw in and orient students towards the concerned learning objective
- **interactivity** in the form of activities and exercises that increase students' participation in the experience
- **media** to enrich the efficacy of the narrative and help students to visualize what the game seeks to represent
- **contextualization** based on the students' background, culture, and knowledge of the concerned topic

For example, **Edpuzzle** is a free platform that allows teachers to create multimedia lessons using videos interactively as learning tools. This web-based tool allows editing online videos and adding interactive content to target specific learning objectives. Videos can be customized with voice-over comments, embedded assessment questions, links, and more. Teachers can share videos with their students, assign due dates, and track their students' scores and progress over time as students watch videos and answer embedded assessments. Students can watch videos solo or via "live mode" where teachers can show a video as a group activity (Common Sense Education, 2021).

Classcraft is a fantasy game in which students can be warriors, wizards or healers. They form teams and points are earned or lost based on class behavior and performance. In this role-playing game, the evolution of the characters depends on their academic commitment and their ability to collaborate. Each participant can select their favorite character and will earn experience points based on the criteria identified by the teacher. Classcraft is designed as a tool

that adds play principles to teaching. The general purpose is to transform the school year into a game, in order to facilitate learning, involve students, unite the class group and limit their negative behaviors. The users can choose between two paths: use the platform to facilitate class management and promote the development of socio-emotional education, or to guide academic performance.

Goose Chase is a platform for organizing treasure hunts in which it is possible to participate through the use of mobile devices. It is possible to create personalized treasure hunts within which the student has to complete missions of various kinds in order to obtain the best possible score, in competition with the other participants. Individual missions consist of photographing or filming certain targets, answering questions or traveling to specific geographic locations.

Another excellent tool for monitoring the progress of learning in an easy and engaging way is **Plickers**, a free web application that allows to carry out tests, quizzes and other surveys and to collect data in real time. The teacher uses a smartphone or tablet connected to the internet and creates a digital class. Plickers can be a great tool for personalizing lessons and making them interactive and engaging.

Playposit is a freemium web application that enables the creation of interactive video lessons. It allows transforming a video into a hypermedia object in which teachers can insert text, links, other videos, embedded objects, polls, forums, open-ended questions, multiple choices, etc. Videos become multi-channel support for activities, even complex ones, such as the design of a learning path through the web on a given theme or problem; a multilevel text with which one can interact; an involvement and participation tool that also allows dialogue.

Conclusion

Game-based learning and Gamification, although they have different characteristics and paths of extremely different implementations, they are both oriented by the same
principle: make learning more engaging, fun and competitive.

They are very effective strategies and for this reason they are used not only in education for children but also in the world of work to increase productivity and commitment.

In general, being teachers of new millennium requires a constant increase in the methodological-didactic awareness, understand the mechanisms that help generate learning, try to experiment with new ways to learn.
For these reasons, we collected in a Technical Toolbox a number of tools and resources that teachers and educators can use for gamification in digital learning.

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