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# GAMING for skills

## When videogames meet education

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# CHAPTER 1

## INTRODUCTION TO THE THEORETICAL ADVANTAGES OF VIDEO GAMES IN SECONDARY EDUCATION

## 1.1. What are video games? Flashback in Video Game History

The idea of playing video games and the creation of video games did not just appear from nowhere; they were invented. In fact, there are a few people behind this significant invention. Video games are now a huge part of our cultural landscape; however, they have not always been around us, making it difficult to understand that video games did not exist before the 1950s (Wolf, 2001). So, what is a video game?

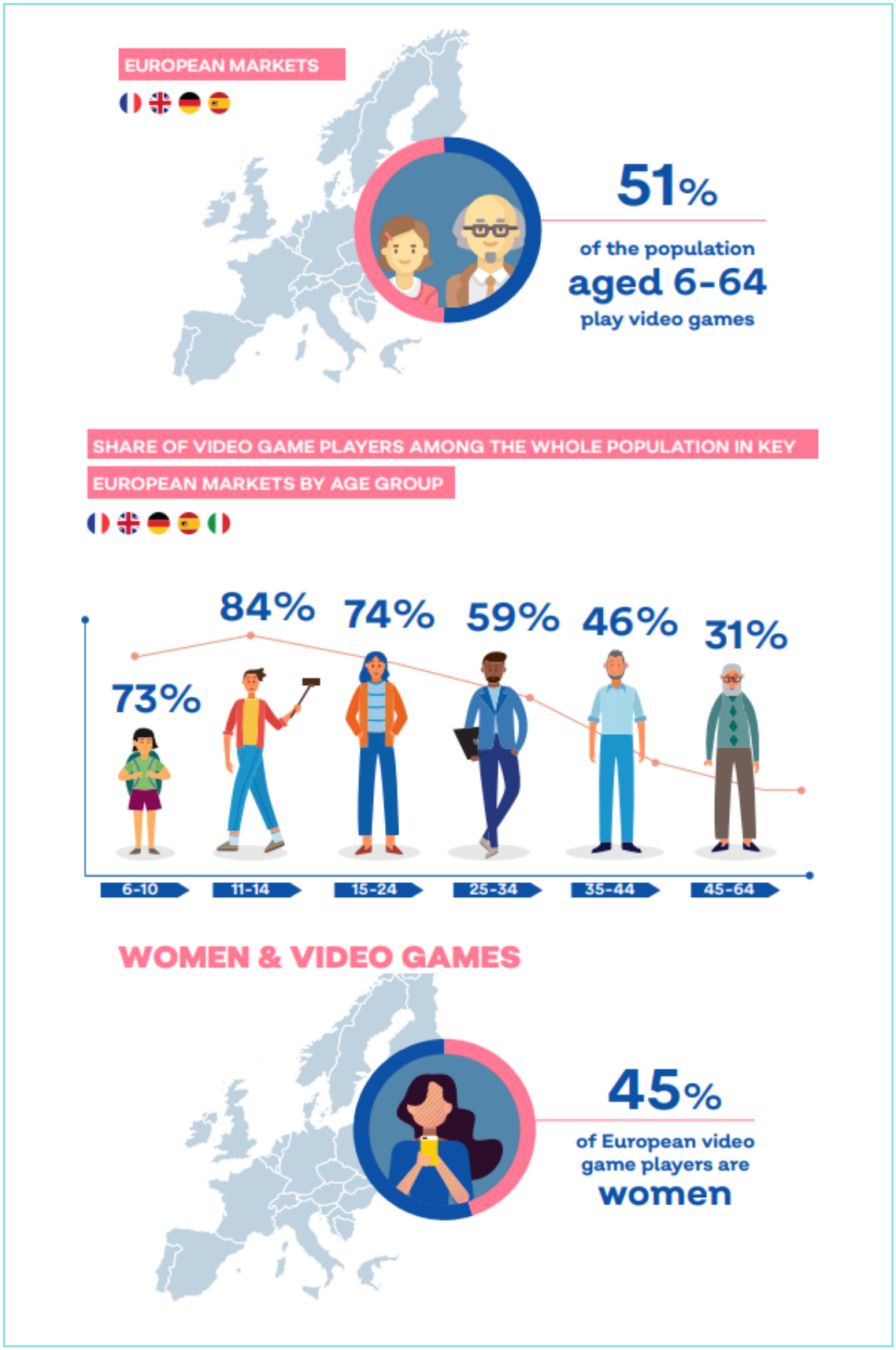
A video game can be defined in two distinct ways, a simple way and a complex way.

Source: https://www.esrb.org/blog/what-parents-need-to-know-about-communicate-online/

The narrower and precise definition of a video game describes it as an **'interactive digital entertainment' in which a person plays through a computer, phone, or tablet, or a gaming console, such as the PlayStation or the Xbox**. This definition pretty much wraps it up. However, in order to understand in more depth video games, a wider, more complex definition is needed. The words 'video game' project a broad link over a lot of distinct things. As we all know, there are thousands of different types of video games, with each one of them functioning as its system of entertaining media. The following question arises from this sentence: why do we consider television and

movies distinct kinds of media from video games? Comparing television and movies to everything that can be described as a video game, can be considered as vague from each other (Owen, 2016). **Therefore, video games, similarly to any other technological device, are media through which students and adults engage in specific activities** (De Aguilera & Mendiz, 2003). Video games can be considered as interactive movies and TV shows, sports taking place on the computer, card games, and digitized board games. They can be defined as a rough simulation of a person's everyday life. They can range from "Candy Crush Saga", to "League of Legends", to "Super Mario Bros", with none of these games being similar to each other (Owen, 2016).

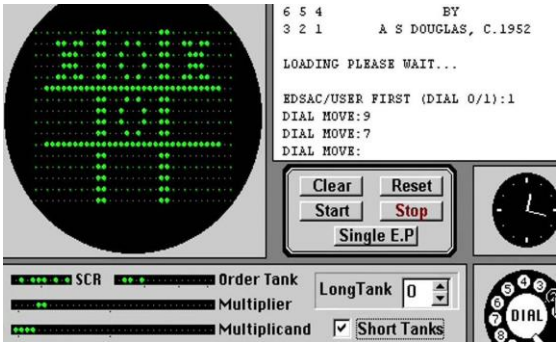
Statista, a German online portal for statistics, depicts that in 2018, 66% of the US population accounted as gamers. Furthermore, the **number of active video gamers worldwide in 2020 corresponds to 2.69 billion**, equivalent to 34% of the total world population, 7.8 billion (2020) (Gough, 2020). **In key European countries, 84% of students aged 11-14 and 74% of individuals aged 15-24 play video games.** 77% of these video game players play at least one hour per week. (Europe's Video Games Industry, 2020). The data convey that the 'love of gaming' is common between both young and old, but also depicts a rise in female gamers (Gough, 2020). The remarkable growth of the video game industry verifies that game developers, storytellers, and artists are the 'brightest light' in the world's economy; each year discovering more ways to delight the world's 2.69 billion gamers (Entertainment Software Association, 2018). By the end of 2020, the video game industry could be worth more than 90 billion US dollars in the world and a rapid increase of players could mean that more than 2/3 of American household members play video games frequently.




Europe's Video Games Industry, 2020
Source: https://www.isfe.eu/wp-content/uploads/2020/08/ISFE-final-1.pdf

Similarly, according to **2020 statistics of four European countries** – France, UK, Germany, and Spain – **51% of the population aged 6-64 play video games, and 77% of these video game players play at least one hour per week. Furthermore, 45% of the European video game players are women**, and it has been depicted that the girls who play video games are 3 times more likely to study a STEM-related degree than girls who don't play video games. (Europe's Video Games Industry, 2020)

But how did video games end up being in high demand?




OXO (Nought and Crosses)
Source: https://www.lifewire.com/oxo-aka-noughts-and-crosses-729624

Before thriving into an item of mass consumption, video games appeared as an experiment and novelty – something that has never before been experienced which is therefore interesting (see' NOVELTY | Meaning in the Cambridge English Dictionary', n.d.) – and then developed into the 'hobby' we all know today. Video games have been slow to gain acknowledgment as an artistic medium in the academic world, even after sixty years of their existence. The concept of video games being considered a form of art is a topic commonly debated within the entertainment industry. In the early development of games, graphics used were simple and the mechanism as a whole did not have an extensive impact on culture (Wolf, 2001).

Even after gathering all known information about the invention and development of video games, there is still a debate today as to who was their first inventor.

In 1952, A.S. Douglas, a British professor, as part of his Ph.D. dissertation at the University of Cambridge, created OXO (noughts and crosses or tic-tac-toe). In 1958, W. Higinbotham created for the yearly visitor's day of the Brookhaven National Laboratory in Upton, New York, 'Tennis for Two'. This was created on a large

analogue computer and a connected oscilloscope screen. In 1962, S. Russell invented Spacewar! at the Massachusetts Institute of Technology. Spacewar!, is a space combat video game based on the computer for Programmed Data Processor-1, a then highly advanced computer usually found at universities. This marks the first ever video game, that was achievable to be played on numerous computer installations.

Moving on to 1967, at Sanders Associates, Inc., where developers led by R. Baer, created “The Brown Box”, a multi-program, prototype multiplayer video game system which was played on television. Baer, also known as the “Father of Video Games”, gave the license of his device to Magnavox, an American electronics company founded in 1917. In 1972, Magnavox sold the system to customers as the first video game home console named the Odyssey. During this year, the first arcade video game was released, an inspiration for Atari’s Pong and one of Odyssey’s 28 games. In the coming years, the Odyssey console died out as it was not considered a commercial success after all. In 1977, Atari released a home console, called the Atari 2600 – also known as a Video Computer System – including joysticks and game cartridges for playing multi-coloured games. Successfully, kicking off the second generation of video game home consoles (History.com Editors, 2017).

Atari 2600
Source: https://en.wikipedia.org/wiki/Atari_2600

In between the late 1970s and early 1980s, it is worth mentioning that the video game industry had the following milestones:

- In 1979, the first third-party developer game, Activision, developed software without the creation of consoles or arcade cabinets;
- The introduction of Pac-Man – a Japanese arcade game machine – to the US;

- Donkey Kong – introducing to the world the character Mario – created by Nintendo;
- The first Flight Simulator game was released by Microsoft.

In 1983, the video game industry in North America had a major “crash”. Factors include an overfilled game console market, huge competition for computer gaming, and an excess of low-quality games, such as the notorious E.T. In 1985, the video game industry started to recover with the introduction of the Nintendo Entertainment System (NES, also known as ‘Famicom’ for ‘family computer’ in Japan) – Nintendo which began as a playing card manufacturer (1889) – to the US. Nintendo released several video game franchises still known and used today. This includes, “Super Mario Bros.”, “Metroid”, and “The Legend of Zelda”. In 1989, Nintendo releases the famous 8-bit “Game Boy” video game device, and several successful successors to the “Game Boy” released over the next 25 years (coloured Game Boy in 1998; Nintendo DS in 2004; Nintendo 3DS in 2011). Throughout the late 1980s to mid-1990s, a number of new franchises, consoles, games, even movies based on video games were released. In 1995, the Saturn system was released in North America by Saga, 5 months in advance of the schedule. This was the first 32-bit console that played games on CDs instead of cartridges. This rapid move was to beat the release of PlayStation, Sony’s, with its “invasion” into video games. In other words, Sony conquered the video game industry and continued to do so in the following generations. In 2000, PlayStation 2 was released, which went against the Nintendo Gamecube (2001), Saga Dreamcast (1999), and Microsoft’s Xbox (2001). Soon after, it became the best-selling game console of all time.

Angry Birds
Source: https://en.wikipedia.org/wiki/Angry_Birds_Friends

In 2005-2006, kicking off the modern age of HD gaming, PlayStation 3, Xbox 360, and Nintendo's Wii were released, a tense competition of opponents. Throughout the technological advances of the next couple of years, video gaming spread to social media platforms (e.g., Facebook) and mobile devices. One of the most known, video games for phones and tablets was Angry Birds, which in 2012 made $200 million (History.com Editors, 2017)

On the one hand, video games are used in entertaining players, and on the other hand, they are also a source of boosting the global economy. The video game industry has a striking influence on the economy – **'representing one of Europe's most compelling economic success stories' and is worth more than 21.6 bn euros.** (*Economic Success*, n.d.) The gaming industry is a powerful economic source as well as a compelling job creator (see 'National Economic Impact of the U.S. Gaming Industry', n.d.).

## 1.2. Do video games have a place in education?

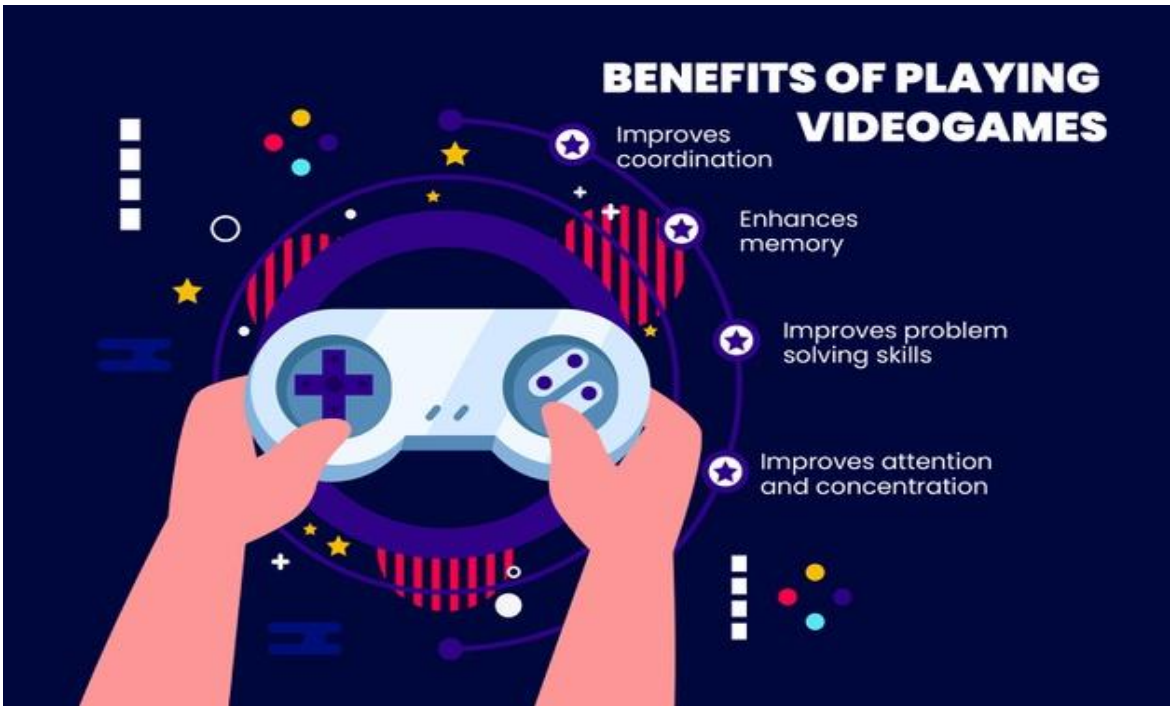
It is significant to highlight the way video games can influence a child's and adult's learning process, but also how they affect the educational process in general. The first research was somewhat between the late 1970s and early 1980s – not many years after the video games first started to circulate to the public – and was based on the children's motivation for learning, including their cognitive potential.

Since new advances in technology are continuously developing, technology is constantly in a state of change (Adapt to Technology, n.d.). Therefore, in order to offer competent solutions to today's social problems, individuals should adapt to the conditions imposed by this new context of society as well as obtaining a general comprehensive knowledge of the characteristics of change in technology. Consequently, it is not enough to only educate the population on the new technology and media, its languages, and the cultural universe it is linked with. Equally essential is to redefine and rethink the whole educational system, including its media settings, the

concepts, and the methods it is based on. The idea is to build the abilities, skills, and crucial knowledge that allow people to formulate alternative meanings. The optimistic potential of technology, specifically electronic media, is still not recognized or accepted by a significant number of professionals in the educational system. In the same way as reading, arithmetic, writing, and other long-established skills have been traditionally emphasized at schools, people in charge of the educational system should now identify and apply this composite network: the continuous flow of various signs and symbols communicated through specific technical devices, in compliance with the different cultural means which establish a parallel school. In alignment with the previous sentence, in recent years, a number of initiatives were developed with the unique purpose of experimenting and discovering the relationship between video games and the school curriculum. Nonetheless, these remote cases are still in their emerging stages and will not be combined into the educational teaching system any time soon.

It can be summarised that combining video games and the learning process are of undisputable importance and can be used at distinct academic levels. Further to providing inspiration in motivation, video games are acknowledged as useful in obtaining practical skills, increasing the perception of an individual, and developing and encouraging skills in problem-solving, media and tools organization, strategy assessment, and retrieving intelligent answers (De Aguilera & Mendiz, 2003).

## 1.3. Advantages of video games in secondary education




Benefits of Playing Video Games
Source: https://www.freepik.com/free-vector/benefits-playing-video-games-with-details_7853586.htm

Years of research have been dedicated to the effects of video games on children's aggressive behaviour; however, in order to truly understand the impact of video games on students' development, we need to consider a more balanced perspective. Considering the drastic change in the nature of video games in the past fifteen years – i.e., becoming more complex, realistic, diverse – and in order to have a broader perspective on video gaming, it is important to focus not only on the possible negative effects of video games but also on the benefits of playing such games (Granic et al., 2014). Therefore, let us investigate how secondary education students benefit from playing video games.

- Video games may help individuals develop patience and persistence in completing challenges, through the repetition of levels. For example, individuals will have to repeat a challenge several times before they succeed.
- Individuals develop problem-solving skills.

- Video games ‘teach’ individuals to strategize logically for the completion of tasks.
- Individuals develop spatial reasoning skills through video games by moving along dimensional worlds.
- Learning a skill in video games and applying it to a different challenge later on may help in the educational process. This is significant for developing individualized learning – a process of teaching in which everything (content, pace, instructional technology) is based on the interest and ability of the learner. (*Individualized Learning for Students*, n.d.)
- Video games help individuals develop logic and reasoning skills.
- Video games can be stress relievers and can help to calm an emotionally intense individual.
- Offer an escape for individuals who prefer calm environments, limited social engagement, the ones that need to reboot their minds, to pull away for a while.
- For individuals to progress through a video game, they can be pushed to make decisions based on ethical and moral judgment.
- Video games teach individuals that failure is unavoidable and how to cope with it and rebound when things do not go as planned. This could be one of the most important benefits, as it prepares individuals for the real world by developing their ability to reflect upon failure and creating new plans to overcome obstacles. They can simulate real-life circumstances and lay fundamentals for skills to be used later in life.
- The video game experience may help individuals with specific needs to develop neural paths and virtually experience the world.
- Stimulate an individual’s curiosity and interest in fields such as STEM as well as help them develop an understanding of technology and programming.
- Through gameplay, individuals may grow confidence. They can solve levels and

win them through trial and error. What if we gave youngsters more chances to learn through an error in real life?

- Video games are perfect for the promotion of motivation, setting clear goals, interpreting outcomes and feedback.
- Individuals may learn collaboration skills by working together in a consistent way and playing games which require two or more players. (Erin, 2018) In some instances, a single-player game can even be played with a ‘copilot’ or coach that provides advice during challenging passages.

Source: https://jtcl.org/playing-video-games-is-good-for-your-brain-heres-how/

There are thousands of video games, all of them having distinct themes and goals. Many of these video games are played cooperatively or competitively. An individual can play on their own or with other physically or virtually present online players and can be played on several different devices – from consoles to computers to mobile phones. Secondary education students benefit from playing video games in relation to cognitive, motivational, emotional, social advantages (Granic et al., 2014).

Video gaming offers knowledge of other cultures and worlds, provides a fantasy as well as the ability to solve problems, and inspires the growth of logical and spatial skills. For instance, visualization of objects and their relation in space, organization of

various factors, i.e., thinking strategically. Each type of video game – taking into account age, gender, and academic level – can be linked with abilities and skills associated with learning and education in general. Summarizing the aforementioned: platform and arcade games can be contributory in the development of psychomotor and spatial orientation skills; dynamic and sports games enable better co-ordination in psychomotor and may be used as stress relievers; role and strategy games help in stimulating the internal motivation and reflection on the standards of the games; question and puzzle games help in the development of an individual's ability to reason and think logically; lastly, simulator games help to develop intellectual abilities and expertise in machines (De Aguilera & Mendiz, 2003).

In contrast to some individual's conservative beliefs, playing these video games endorses a wide range of cognitive skills. This is especially true for "action" games – shooter video games – many of which are considered violent by parents. Evidence has emerged from various research and training studies that use naïve gamers – the individuals who have hardly or never played an "action" video game – and assign to each of them, at random, to play an "action" shooter video game for the equal period of time. Compared to other participants, the ones playing the shooter video game depict a faster and more accurate attention distribution, a developed spatial resolution in visual processing, as well as improved mental rotation abilities. Spatial skills developments resulting from playing commercially available "action" video games are analogous to the effects of formal – high-school and university-level – courses designed to enhance these same skills.

Furthermore, spatial skills can be even trained with the use of video games in a comparatively brief period of time, and these skills can be transferred and used in other spatial tasks outside the video game setting (Granic et al, 2017).

One of the oldest and most well-justified theories of communication research for the use of diverse forms of media is for individuals to learn how to improve their emotional states and to manage their moods. The concept of gaming might be one of the most effective and active means by which players develop positive feelings. Additionally,

various studies have shown a fundamental relation between an improved mood or increase in positive emotion and playing preferred video games. For instance, several studies have suggested that playing puzzle video games – i.e., games with minimal boundaries, short-term commitments, and a high degree of availability – can improve an individual's mood, promote relaxation, and help dissolve their anxiety. Further, it has been advised that some of the most penetrating powerful positive emotional experiences are activated when playing video games (Granic et al, 2017).

Similarly, video games grasp huge potential in teaching new forms of thought and behaviour. We claim that this learning possibility remains mostly unused in the mental health arena, and addressing this hole holds an excessive deal of promise for a fundamentally new approach to invention. The immense majority of interventions based on evidence in this field are a foundation of cognitive-behavioural principles. Despite the optimistic conclusions about the usefulness and effectiveness of cognitive-behavioural therapy (CBT), embracing limitations has also been pointed out. Video games can, therefore, uniquely and significantly discourse these limitations, and improve some interference effects across a wide spectrum of disorders. One of the first limits of a number of approaches based on evidence – mainly those focused on CBT principles – is that they largely depend on communicating psychoeducational information typically in some didactic style. It is certainly critical to learn about the amount to which our emotional state is complicatedly related to our thoughts and how this interface underpins behaviour and problem-solving strategies (i.e., cognitive biases). Nevertheless, students often find these lessons tedious, especially if they are not in therapy for mental health problems or if they are unaware that they might be facing a mental health challenge.

In this case, the use of a video game may help address this barrier and impact this same knowledge by using components of play and game mechanics that have been established as vastly engaging. A fantasy role-playing game, SPARX, was developed based on CBT to increase engagement, and help young people with mild to moderate depression, stress or anxiety, and overcome their condition (Lien, 2012). A

randomized precise trial depicted that the game has the same effect as treating depression at a therapist-administered CBT program (Granic et al, 2017).

Most importantly, video games connect people of different ages, gender, culture, socioeconomic backgrounds together, and individuals can both strengthen their existing group of friends and help them create a new network of friends, which is usually different from the one at school/work, where they share identical interests in gaming and experiences either online – by playing together – or physically – by visiting video game events and conventions. The use of video games is a way of staying in touch with people, even with the ones that live in different countries around the world (Shi et al., 2019).

Technological advances, such as video games, bring new challenges to the arena of education. Computer and video-based games, acquire advantages that are not present in other learning approaches. For instance, the ability to select distinct solutions to a difficult problem and view how the decisions affected a fictional game may allow an individual to experiment as well as develop problem-solving skills in a comparatively safe environment (Griffiths, 2002). Games can also offer a cathartic experience to players where they can do things that would be impossible in the real world.

Students are offered a chance to relax, achieve goals, be challenged, and, last but not least to exert control. Video games help them de-stress and relax from their heavy workloads (Shi et al., 2019). Throughout the years there is a vast increase in players that are playing games online, with their friends, with their family, or with strangers, interacting with other players from all around the world, overcoming cultural boundaries, age and generation gaps, socioeconomic boundaries, and language barriers (Granic et al., 2014).

## 1.4. Debunking myths about video games: why it is important

We all have preconceived ideas about any form of activity or leisure, and in particular about people who practice these activities, and very often they come with a positive and a negative side. These ideas can be statistically true or false, but it is important to keep an open mind not only to make sure we do not hold prejudices against others but also to remain open to new perspectives and knowledge.

Consider these few examples:

- when you see someone interested in mathematics, do you expect them to be interested in literature?
- would you be surprised to hear a rapper saying that he/she loves opera as well?
- would you be surprised to see a girl who plays soccer but also likes activities considered as 'girly'?

Having preconceived ideas about people and their hobbies carries the danger of letting oneself get influenced by them and reducing others' potential in our eyes. This is especially important for educators when thinking about the hobbies of their students: you may or may not like these hobbies, but it is essential not to infer that these hobbies are bad, as this could alienate your students, and hinder their learning journeys.

Before diving into the analysis of video game myths, let us consider the following factors that contribute to explain why there can be so many negative myths about video games. This list is by no means exhaustive but it offers the first steps towards thinking critically about video game myths.

Historically, new hobbies for teenagers, in particular, have been met with scepticism by adults in general, and in the world of formal education. One of the reasons behind this is the fact that when a cultural product is created for teenagers, it uses codes that belong to teenagers' culture and that require extra effort from adults to dive into and

understand. In that sense, lack of knowledge is the basis of prejudice. Comics, for instance, have been considered to have a negative influence on youngsters' sense of morality in Europe and the US. While most of the laws to limit the scope of youth literature were passed in the 1940s and they tend to be less applied nowadays, one could also consider that in general, European comics are perceived as more serious and proper for reading than American comics or manga that are perceived as more violent. On this point, in particular, the parallel with video games is easy to make.

The use of screens and the digital sphere amplifies preconceived ideas against video games: each generation grew up with different technologies and can feel dubious about new uses of technology. For instance, television and the diffusion of violent shows have been considered to amplify violence among youth. Access to personal computers, mobile phones, and then smartphones and tablets for teenagers all come with reactivated prejudices about the effects of technology on youth – whether they are true or not.

Such factors contribute to the most common prejudices against video games, according to which video games would make players violent, addicted, hyperactive, socially isolated, fail school, and lead to countless other problems. We will explore these myths as well as other perspectives on video games in education in a series of factsheets.

There are other myths which are more positive, but still they should be taken with caution: some think that video games could fulfil the role of an educator, or that they could compensate for symptoms of some disorders, but research is still limited on these scopes.

Before you read our factsheets, let us  with a general piece of advice related to video game myths: please handle them with care. If you wish to analyse game material critically with your students, make sure that you are not only perceiving this material from a negative perspective. People who play video games are often passionate about their hobby, and they are used to having figures of authority, such as political and media figures, who criticise games even when they have never played themselves.

Therefore, showing that you are willing to acknowledge positive aspects you had not considered before can create an interesting dialogue with your students.

# FACTSHEET
# Are educational games the only ones that have a place in education?

## What are educational games?

Educational games are computer programs that aim to pass knowledge to the players while entertaining them.

Starting in the 1980s but with a particular boost in the 1990s, quite a few educational games were created, such as Broderbund's 'Where in the world is Carmen San Diego' (1985) or Coktel Vision's Adi and Adibou series (1992). In the first one, the player discovers the world by chasing a spy turned art thief, and in the second one, the player completes exercises in school basic skills while discovering the daily life of a character from outer space.

Nowadays, it is easy to find apps or short games that allow students to complete exercises in basic skills that answer the needs of the school curricula. Wouldn't they sound like the perfect tools to use in class? Here are some perspectives to show that educational games are not always appropriate for secondary education.

## The limits of educational games in secondary education

Firstly, educational games tend to cater to the needs of primary education and lower levels of secondary education. It is easier to create programs that can check the results of spelling exercises and simple calculus rather than checking whether a student wrote a logical essay.

Secondly, educational games are often developed with the parents or educators'

needs in mind. They can often have narrow outcomes and be infantilising. They are not always very engaging to the learner as there is rarely any real story behind completing the tasks. A bad educational game could alienate your students.

The bottom line is not to expect video games to be just a digital transposition of what you already do well in your lessons.

While educational games could fit some educational purposes, they rarely make the most of all the opportunities offered by playing a real game.

Source: Character vector created by vectorjuice - www.freepik.com

## How can mainstream games contribute to education?

Mainstream or ‘non-educational’ games have their own place in an educational setting. Some games that were not originally conceived to be educational, such as Sid Meier’s Civilization or SimCity series, can develop players’ soft skills and prompt them to research historical facts and examples to understand game mechanics. In Civilization, the players start their civilization on Earth and advance through historical times by managing resources and developing their influence. In SimCity, the player is the Mayor of the modern city they create and they have to make it grow while managing

many challenges (crime, natural catastrophes, utility supply, etc.). Both can offer a practical look into history, geography, urbanism, and politics. Examples are countless, and even basic games such as Super Mario Bros could be a good introduction to show that learning is not a smooth process.

### Educational versions of mainstream games

More and more mainstream games are now offering educational versions. In Minecraft EDU, classes can create their environment and complete exercises. The producers of Assassin's Creed have created Discovery Tour versions that allow us to explore Ancient Egypt and Ancient Greece. These educational editions allow to build from player's relationship with the original game, but depending on the possibilities they offer, they are not always the most engaging games either. For instance, in Assassin's Creed's Discovery Tours, the player can walk around, listen to the narrator, and dialogue with characters, but there are no fighting nor other game mechanics. It would not be honest to say that they are not interesting to use in the classroom though, as they offer beautiful renderings and more interaction than a textbook or a video.

### I am confused: what kinds of games should I use?

The simplest answer is to choose a game according to the learning outcome you are aiming for in terms of skills and or knowledge. A good rule of thumb is not to focus only on games that are branded as educational but to use different games that tackle the topic you wish to explore in your lessons.

# FACTSHEET

# Do video games make players violent?

## Why do we keep hearing that video games make people violent?

One of the most common myths about video games is that they make players violent and aggressive. Exposure to violent media, in general, is an easy scapegoat for media figures to blame when violence is perpetrated by teenagers and young adults. The fact that a perpetrator played violent video games is often presented as a cause of their action in media because of the myth that video games make people violent which in turn reinforces the myth.

## Science has not established a link between playing games and committing violence

The logic behind thinking that playing violent video games makes players violent is that if players spend time punching and shooting things in games, they feel encouraged to do it in real life. First, this ignores the cathartic effect of culture. But more importantly, there is no scientific proof that (violent) video games make players commit violence. There was a debate until the beginning of the 2000s that playing games can raise one's adrenaline or cause frustration (especially when games are difficult), which can make players more impulsive in the minutes after playing. Such experiments in laboratories are now considered to be hardly replicable in real life and might suffer from a confirmation bias (Jones et al., 2014).

Having said that, it is important to bear in mind that studies could still contradict one another. Psychologist Lalo argues that studies tend to be inconsistent because it is difficult to have the right samples and the right games in studies. Ideally, to measure

the true effect of video games, the best would be a worldwide study on the same game that would take into account all the environmental factors of the subject for the previous 10 years to make sure all factors would be taken into account (Mourgues, 2019).

## Why do people play violent games?

For someone who does not play any form of video games or any games depicting some form of violence, it can be shocking to see youngsters having fun while punching their friends' character in a game, shooting realistic characters, or acting in a morally questionable way.

First, not all players play extremely violent games, and what violence is in games can be perceived differently. Technically, Super Mario Bros makes the player crush their enemies by jumping onto their head or throwing fireballs at them. Most players of The Sims have had fun torturing their characters just because they could. However, defining what violent video games are might not be the most important thing.

The examples above might not be perceived as violent by the players because they are directed against virtual avatars, and they can relax players as they allow them to spend extra tension or energy in a virtual environment without any strings attached. Regarding players enjoying games, violence does not seem to be a significant factor compared to the challenges and freedom of action in games (Przybylski et al., 2009).

## How can I manage students' anger and excitement when playing in class?

The most practical issue for educators would be to manage students' emotions when playing in class. The excitement or the frustration that players can feel might make your students burst out in the classroom or at each other. Let us check a few examples and see how you can transform these behaviours into positive group energy:

Source: People vector created by freepik - www.freepik.com

### What should I do if my students start shouting at or insulting one another?

Ask students to sit down and tell you what happened. Then, ask the class if they have ever felt the same in relation to the game, and how they managed to overcome their frustration. Bear in mind that some games can have design flaws and can be frustrating at times.

### What should I do if my students get mad because they lost a game? What can I do if some students do not manage to play or win a game?

Allow the student to calm down, then ask students who are more used to the game to teach them how to play as calmly as possible. Tell them about the importance of trial and error in the learning process, as this applies to video games as well. Be clear that you are not forcing the student to enjoy the game, but to think critically about their playing experience.

# FACTSHEET

## If I don't play much/at all myself, can I really expect to use games with my students?

It can be intimidating for teachers and educators who do not play video games regularly or who have never played at all, to start thinking about using video games or game-related material in their teaching activities. Here are some ways to get started:

- You could ask your students what games they like and watch their trailers, maybe gameplay videos, and look whether other teachers have already used them in the classroom to get inspiration. If you can, try to play a few games from your students' suggestion.
- You can look for lists of games that could be useful for the subject you teach for particular lessons.
- If you do not have a lot of resources available, do not hesitate to start by using game trailers or other videos to prompt conversation with your students about a specific topic (such as comparing the depiction of war or battles in different games). It can be a good tool for media education.
- You could also introduce a lesson topic and ask your students to look for games related to it, maybe even to prepare a presentation about the games.

Source: People vector created by pch.vector - www.freepik.com

In other words, you do not have to bring games into the classrooms yourself, but you can discuss the topic with your students. Remember to keep an open mind, even when students mention games that look violent or that you do not find interesting: if you ask them why they like them, it could help you create a connection through their interests, understand video games a bit more, and find ways to use them in the classroom.

If you feel unsure, do not hesitate to make the game a small part of your lesson at first, and ask your students if they found it interesting or if it sparked their curiosity.

In Gaming for Skills, we are developing 88 pedagogical sequences to bring video games into the classroom that are meant to be used by educators who do not have specific knowledge about video games.

In addition, to discover games that can have a positive impact, take a look at: https://www.gamesforchange.org/games/

# CHAPTER 2

## VIDEO GAME CONTRIBUTION TO EDUCATION

## 2.1. Video Games and Knowledge

### The contribution of Game-Based Learning

In a world that never stops, technology is the trigger of all major changes. A major part of these changes is represented by video games, which according to some “changed the way those people raised in this time period think, learn, and process information.” (Prensky, 2001)

In this context, it is inspiring to see so many players fascinated and passionate, sharing a virtual space, and having a feeling of belonging. This powerful industry is continuously evolving and bringing into the spotlight some new technologies that can be applied not only to gaming but also improving learning processes, skills and know-how. There are even educational games, which are games that are explicitly designed with educational purposes that will tackle specific topics. But this world of games is rich, and the players can learn from their own playing experience, through discovery, failure, interactions. Using games to enhance the learning experience represents a new alternative, game-based learning, with a holistic approach, students will discover and acquire important skills that will prepare them better for the future.

### Knowledge in the context of video games

A traditional method of learning will help students acquire skills and abilities by managing information, however, there is no practical component in most cases. It is a learning that is out of the context because usually the environment needed to correlate the knowledge with the practice cannot be assured and the knowledge is separated from the knower.

“In video games the known and the knower are inseparable; the actions of the player interact with the game-play environment creating an information-action coupling.” (Sandford, 2009).

What is even more specific about the knowledge in the context of video games is that

the skills and abilities are acquired gradually, through a series of actions, events, situations that will help the learner to improve decision-making, form their own opinions on a topic, develop better comprehensions skills and overall improve their critical thinking process.

### Learning principles

Good game-based learning is related to principles that are incorporated in video games and that should be applied to school learning. James Paul Gee defined a set of learning principles that could transform learning and empower the learners. Why are these learning principles important? Because somehow, they translate the process of playing video games into quantifiable skills and attitudes. The principles, as presented by Gee are the following:

- Identity: take on a new identity in developing a virtual one; the player will have to establish a connection between their virtual identity and the virtual activity
- Interaction: the relationship between the player and the game's environment
- Production: every action of the player and their choices throughout the game, establish a path "Even at the simplest level, players co-design games by the actions that they take and the decisions that they make" (Gee, 2005)
- Risk-taking: failure as a positive thing, leaving room for taking risks, exploring, seeking new strategies without being afraid of the outcome thanks to the ability to try again
- Customization: the choice of how to play the games belongs to the player, as video games usually offer a level of customization
- Agency: players have control of the game environment, not a common situation in the context of traditional learning
- Well-Ordered Problems: from one problem to another, everything is gradual,

from one level to the other at least in more traditional video games

- Challenge and consolidation: learning is consolidated through repetition and challenges. “In school, sometimes the poorer students don’t get enough opportunity to consolidate, and the good students don’t get enough real challenges to their school-based mastery.” (Gee, 2005)
- “Just in Time” and “On Demand”: the flow of the information in schools should be the same as for the video games; you receive the information when you need it or when you ask for it.
- Situated meanings: new learning with the help of images, actions, and other game situations, new words have meaning.
- Pleasantly Frustrating: the game should be frustrating enough to challenge the student, but easy enough for him to overcome the problems.
- System Thinking: the pieces of a game will fit together, drawing a larger picture, not just individual action taken separately
- Explore, Think Laterally, Rethink Goals: going fast from one topic to another is what students do in a traditional school system. In the world of games, the attitude is different, you learn to explore all the possibilities, to take time, to think laterally.
- Smart Tools and Distributed Knowledge: the virtual background of the games contain characters that can distribute their knowledge to the players
- Cross-functional teams: in multiplayer games, there are players with different skills that need to rely on each other
- Performance before competence: you compete only after you perform

## The educational role of games in developing skills

The role of educational games and non-educational video games is not to replace a traditional learning system, but on the contrary to enhance this process by helping and supporting students in acquiring a set of skills useful not only in the classroom but also in preparing them for personal and professional development. There will always be a link between the knowledge and skills obtained in one context (the video game environment) and applied in another one (the classroom). “Players apply their skills and learn from experience as they focus on achieving the game goal.” (Liberman, 2014). As a matter of fact, video games are experiential, almost a pattern: you decide to play, you are ready for the experience, and you try, succeed or fail and try again. These skills are rehearsed until you learn from them. In addition, as a player, you are going to acquire “spatial and logical skills, such as visualizing objects and relating them in space” (Miguel de Aguilera, 2003). In conclusion, these new circumstances imposed by the environment of video games will help the players to change and to acquire comprehensive knowledge in order to adapt and find solutions not only for the stages and challenges raised by video games, but also by transposing them in real life situations.

## New media literacy through videogames

A fast-changing world requires new competencies in order to be successful in the 21st century.

Leonard A. Annetta, in Video Games in Education: Why They Should Be Used and How They Are Being Used, talks about a set of new media literacy including play, performance, simulation, appropriation, multitasking, distributed cognition, collective intelligence, judgment, transmedia navigation, networking, and negotiation. These are the foreseen skills needed in a century that will focus on applying technologies and developing new systems, processes, and ideas. In addition, tackling media literacy by analysing the representation of specific groups or figures, such as historical figures, in

video games, can help students activate their critical thinking. By allowing them to express their opinion about a media that does not belong to the traditional school environment, students' learning experience evolves, adapts, and can become motivating.

### Educational and non-educational video games

While learning outcomes and educational objectives are generally clearer with educational games, using a non-educational game has the potential to offer almost the same perspectives in the learning experience, offering an interesting and attractive approach to the unit study. Some of the following examples will include educative and commercial games that provide motivation, development of skills, and encouragement of collaboration while addressing different topics.

**Placespotting** is a geography-based, educational game, using Google Maps. As a player, you must find locations based on pictures with clues or descriptions of events (placespotting.com). But also, a non-educational game, **Pokémon Go** (pokemongolive.com) tackles a variety of subjects. The interface of the game provides a digital map that helps with orientation and map-reading skills.

**Cell Craft** (carolina.com) is an educational game that teaches about cells, their structure, and how a cell survives a hostile environment. **Spore** is a commercial video game, successfully integrated by many teachers in the classroom, in biology lessons. The students will be able to create their world while complementing the teaching materials (spore.com).

**Global Conflicts** (seriousgames.net) is a series of educational games designed to allow students (ages 13-20) to learn about various conflicts around the world and the underlying themes of democracy, human rights, globalization, terrorism, climate, and poverty. On the other hand, maybe **Civilization** (civilization.com) is one of the most

well-known commercial video games. The students can learn many things while playing this video game, including strategic thinking, technology, economy, diplomacy and even cost benefit analysis.

**Food Force 2** is based on the earthquake in Haiti with the purpose to provide humanitarian relief. This game was created to educate and motivate people to solve world hunger and social problems (pygame.org). **Sim City** is a city building and urban planning simulation, which still attracts a lot of players. It encourages them to set goals, test hypotheses, and transfer knowledge from one experience to another (www.ea.com).

**Minecraft,** (minecraft.net) another commercial game, can support and develop a series of skills in different fields while having fun. But at the same time, there is **Minecraft: Education Edition** (education.minecraft.net), specially designed for education in the classroom. It uses some features from the commercial Minecraft but adds collaboration tools, classroom control to support students learning. It is more like a platform based on a popular game.

And these are only a few examples of the educational and non-educational games that can improve every curriculum, introducing the fun part into the learning context.

## 2.2. How video games can be used in a pedagogical context

### The pedagogical context of video games: is the classroom ready for them? Moving from traditional teaching to interactive and collaborative methods.

Learning systems are no longer able to sustain traditional methods. It is not enough just to “pass” the knowledge from teachers to students, it’s not working anymore. The information “must be learned by them, through questions, discovery, construction, interaction, and, above all, fun.” (Prensky, 2001).

There are new ways of learning that can be more motivating than a traditional learning system. These ways need to be explored as they are connected with the ‘nowadays’

reality and digital technologies. If the classroom is not ready for them, it will be a good opportunity to start now, incorporating the new media literacy, the experience from other classrooms, and the numerous possibilities offered by game-based learning.

### How can Digital Game-Based Learning be used in various disciplines?

The use of video games in various disciplines is not by chance, it has a specific goal, and we can learn a lot from video games. What we don't know for sure is the extent to which the results of digital game-based learning are similar or differ from those of other activities. The commercial educational video games, known also as edutainment, are focusing on specific skills, in which the parents are satisfied with the combination between education and entertainment, considering that while playing the children will also acquire some specific basic skills. Video games used in maths, programming, physics, geography, history, biology, spelling, reading were demonstrated to facilitate learning. There are still a lot of misconceptions and scepticism when using digital-game-based learning, but the current findings on the learning outcomes are promising and are encouraging this approach. Of course, not all learning outcomes in a discipline will come from playing a video game, but these video games can sustain the process, engaging all the students and helping them acquire some soft skills that are harder to transmit in a traditional system. While playing a video game in a specific discipline, such as educational or commercial, the learning outcome will never be only about the topic, there will be that something "extra" that will encourage the player to find out more, to engage, and to discover.

### Video games can contribute to modernising the school curriculum and activities

New teaching methodologies adapted to contemporaneity are important drivers for modernising the school curriculum. The challenge is to organize the curriculum around learning experiences and acquiring skills, and not around general objectives. The new learning principles and the new media literacy require an updated curriculum that

needs to include these new approaches. This will allow students to take advantage of the different opportunities offered by video games and go through different learning experiences through playing.

### Same game, different students, and how to motivate them

Video games inside a classroom will support the learning process. But will all students be ready to embrace this experience, especially as it is a particular one? If a student is not passionate about playing, how can they be integrated into this digital game-based learning? A video game, besides the specific discipline it tackles, comes with requirements for some soft skills that not all the students mastered. Also, video games are often based on a process of learning through failure, and we are not all able to manage this feeling. So, what can be done to support all the students to be part of the process? It can be difficult sometimes, but not impossible. As a teacher you know your students so, in general, you know what draws their attention. Most video games can adapt to the player's abilities and can adjust the difficulty level. For the most sceptical students, the process will be more interesting, if they see the applicability of these acquired skills in the real world, the transfer from video games to applied context. Some of the most meaningful benefits of using video games in the classroom are:

- Life skills development: patience through repetition, problem-solving skills, decision making, persistency, learning how to strategize to complete tasks, reasoning and logic skills, resilience, collaboration skills in games that require two or more players working together, and many more.
- Video games provide opportunities for STEAM skills development. For example, Minecraft can teach hewing wood, building architectural structures, or reinforcing history knowledge by creating historical sceneries.
- Digital skills development - video games provide technology exploration opportunities for students; thus, they can learn programming, coding, and CAD

design.

- Artistic skills development through games like Guitar Hero, Rock band, uDraw studio.

Being aware of the learning benefits of video games, attracting all the students, and engaging them becomes only a matter of strategy: find out what drives their motivation and follow that path. It is important to be aware of the fact that using video games in the classroom involves teacher-supported learning. The teacher will encourage students' learning through interactions and conceptual knowledge that bring their awareness towards mathematics, science, literacy, foreign languages, literature, history, etc. You could ask your students about what they are playing, this way you can do your research and find out how to combine your curriculum content with their interest/passion. If you don't know how to play the game, just ask your students, they will be happy to switch places and be your teacher. Use collaboration approaches, this way you will support teamwork, but most importantly, you will be able to tackle situations where some students might not know how to play the game.

Also, it is important to have clearly defined learning objectives and outcomes when using a video game. Planning your learning session is important, you can integrate the video game for providing experiential learning on specific topics, at the end of the lesson, for assessment, etc. During the learning session, students should be aware that they are not just playing, but the game is the instrument by which they are learning or showing what they learned. You can develop a whole discussion and help them choose suitable games in accordance with the skills and the knowledge you would like to pass on to your students. Such an approach sparks conversations and allows students new ways of understanding and working with the concepts acquired, not only in the classroom but also while playing at home.

## 2.3. The effect of video games on formal and non-formal education

The potential of video games in education is considerable. In this regard, we should perceive them as more than entertainment, but as an industry or an artistic genre. They are technological advancements, with a very important fun component at their core, that can be perfectly used as an educational resource in any learning environment.

The possibility of creating specific content adapted to any specific educational environment, together with the possibility of approaching these contents through playing, is what makes the video game attractive and perfectly useful as a pedagogical tool. In fact, the idea of introducing the game as a way to promote personal development throughout the experience during the learning process is not new. One of the pioneers in this field was Maria Montessori who, later on, gave her name to the Montessori method (Larson, 2013).

It hardly needs to be said that the adaptability of video games in different educational environments is another of their characteristics. For this reason, we will try to focus on the value of video games in both formal and non-formal educational environments.

There are many possibilities in both educational settings, to the extent that in many cases the pedagogical actions can be similar although the way in which teachers approach the implementation of video games are generally different in each kind of education. As far as formal education is concerned, we have to take into account that there is usually a need to implement curricular content as long as to develop certain skills in students. Video games may be used as a fun pedagogical tool to achieve these goals.

On the other hand, in a non-formal educational context, there is much more flexibility in the way video games may be implemented as a pedagogical tool. For instance, it may be a way to engage a group of children in an extracurricular activity, a means of guiding a group of adults in a professional training session through a gamified process, or it can be part of a video game creation course in a community centre, among other

possibilities.

The use of video games in education arouses great **motivation** among students, which makes it a very effective tool to incorporate into learning processes. The fun factor while playing video games is a key point to have students engaged with the learning processes.

In this sense, it is widely accepted that incorporating fun components in non-formal educational processes helps to engage young students in the learning process. But it has usually been more difficult to incorporate the use of games in formal education. However, the implementation of video games is a very useful tool in formal education contexts: in this sense, they can be used as a complement to fulfil what students have previously learnt with a textbook explanation. Video games tend to be much more accessible to students and may provide them a deeper comprehension of the subject if they are able to learn it by playing or by using a device, they are familiar with. The game will offer them a new perspective of what they have previously learnt as well as it can also provide excitement and inspiration to the students. Moreover, the possibility to bring the educational activity outside of the strictly educational environment can be motivating for students and will help them learn what they are studying from another point of view, much more connected to their day-to-day lives.

Motivation has to do not only with the use of video games but also with the incorporation of **technological tools** in the learning process. A vast majority of young Europeans have been born and raised with technology in their lives and, for these new generations, the most logical and common thing is to use it in all spheres of their own lives, also in the learning environment.

Video games have been on for quite a long time, enough for us to have access to different tools to play with them and pieces of hardware with new ways of interaction (many more than a few decades ago): from the ubiquity of mobile devices, their touching screens, their different kinds of sensors... as well as other devices with new interactive possibilities such as virtual reality sets—to the growing number of software tools that give the possibility to create games to non-creators.  Things have changed a

lot from the time of two-button controllers in consoles up to now. So, bringing these technological realities to the classroom will not only help students to improve the use of technology but it will also make them more engaged with the educational contents since they will be learning in a more familiar and motivational environment.

The use of technology and, more specifically, video games in the education process is also a possibility to bring the education process far beyond the classroom. Most European students have a device at home: smartphone, tablet, computer, etc. If they are highly motivated in the video game learning process, they can practice the contents of the lesson by playing games. So, content worked at school can be expanded in a new way: faster, direct, and connected with the educational goals of the school.

The incorporation of video games in the classroom also requires a paradigm shift in the **role of the teacher**. They need to adapt their vision and pedagogical learning methodology by modifying their sessions in order to use video games as a pedagogical resource. The use of video games can be done either by choosing and playing a pre-existing video game or by creating a custom game specifically adapted to their class.

When choosing a game, teachers will have to evaluate its connection to the curricular contents or the educational goals. When preparing the class, educators must ask some questions: will the students have to put into practice a skill or have to apply certain knowledge in order to advance in the game? Which parts of the game are the most connected to the needs of the educational action? When, where, and how much of the game will the students play? On which device?

On the other hand, considering that today there is a software that allows any non-specialist to create video games, as we have already mentioned above, we have to take into account the option that one teacher may create a specific game which may be specially designed for their own needs. For instance, let's think of a class where students will learn about a piece of the historical heritage from their hometown: the school can consider the creation of a role-playing game (RPG) in which students can

play the role of a character that lives in the historical period being studied throughout a cross-curricular activity in the educational curriculum with the aim that the video game can be used as a tool for learning the historical context the teacher plans to transmit (CoGame Project, 2017).

Besides the aforementioned ways video games impact education, there is at least one more area worth presenting, due to its crucial implication in any learning process: the acquisition and development of skills. Video games can serve this purpose either by students playing them, or by creating a game themselves. In this case, besides the possibility that the teacher creates a game for the students, it is important to notice that they can create a game themselves as another possibility to develop their skills. Again, just like with the curricular contents, educators have to evaluate what skills will a certain game (or a creation process) let students develop and how. At this point, it is worth mentioning that either technical skills or SEL skills -social and emotional learning- (Weissberg, R., 2016) can be worked when using video games as a resource. From reading to programming but also from self-awareness to teamwork can be worked with video games.

### Examples of skills development thanks to video games

Below, we present a set of examples of skills and areas of knowledge that can be put into practice through the implementation of video games in the classroom. Most of them will also be explained in more detail in the following chapters.

- **Project planning**

It is useful when we create a game, but it is also possible to work in a game where players have to plan and manage something, like economic simulators. This will result in students being able to organize and structure their work better. The situations they will manage in a game, as well as the handling of the sequenced group of actions needed to be carried out in the creation process, is what will let students work through these skills. When we create a game, the possibilities are unlimited as there can be

different sorts of video games.

- **Teamwork**

It can be worked either by playing co-op (cooperative) multiplayer games or during the creation process. This will help students manage their relationships and find ways to work out problems or difficult situations together as a team. During the game creation process, from the brainstorming phase to the final steps, each creator may have a specific role but all of them have to put into practice other skills and knowledge that ranges from artistic competences to programming, as well as having contextual knowledge (like historical, scientific, etc.) that would be applied into the game.

- **Writing and storytelling skills**

Video games have narrativity —from narrative games themselves, in which the story is the central part of them, to puzzle games, which even though, they don't need a narrative structure, often have a back story presented as the player advances levels. This comes with many other related skills that can be worked: creative writing, character creation, defining the structure of a story, synthesize and summarise…

- **Definition of game mechanics**

Among all parts of the game that need to be designed, usually in the core of all, there's the game mechanics: it strictly means how the game works and how it is played: i.e., what challenges the player will face, what puzzles have to be solved and, more importantly: how do they work. In this sense, it implies the definition of the ways the game will respond and how the player can interact with it. So, creating a game will need this effort from the player, but also playing a game is a very useful way to learn about game mechanics. This will let students gain a better understanding of how mechanisms work as well as the consciousness that everything needs to be worked on beforehand so as to see the result, not only on the games but on any other process that is structured.

- **Computational thinking**

This term refers to a methodology of problem-solving thought that is carried out with the same logic structures that usually work on a computer program. Today, some games, for instance, Human Resource Machine – Tomorrow Corporation (2015, make the player build a logical structure that “programs” something in the game as a way to learn to program without using a programming language. That is a very interesting possibility to reinforce computational thinking among students. Having this skill developed will allow them to have a better analytic thought, to have tools to reason, and to solve problems efficiently. Teachers might also want to work on this skill by making the students create a game. During the design phase of the video game creation process, creators must define the game mechanics in a way they think the computer will work it out once it is put into action. This is developed by establishing the actions of the gameplay both predicting the player behaviour and defining the appropriate response from the computer in a structured way. That is a very good exercise that can perfectly be put into action in gameplay and thus see the results in a very funny way. Another possibility to further work on computational thinking could be, once the students know how game mechanics work, to ask them how they think the game mechanics of their favourite games work.

- **Creativity and art**

Creativity can be developed in very different situations and practises with games, especially when creating a game, even though playing games can be a good exercise to acknowledge different ways of expression with different languages: visual, musical, literary, etc., and then apply them in any artistic project. However, when creating a game, students will have to design the aforementioned game mechanics. Coming up with the logic of the game, such as: how the difficulty will increase, what obstacles and what rewards will the player find, etc., and combining all this coherently with the visual, narrative, and musical part of the game, is a very good way to develop creativity. Working on it will allow them to have more flexibility when approaching a life situation thus having the ability to consider different perspectives on the same point. As already

mentioned, games include expressions in different artistic languages. So, the creation of graphics, illustrations, animations, pieces of music, sound effects, voice-over, etc., is very common in video games and can perfectly be put into practice. There are games available that centre the gameplay in the aesthetic experience that will surely inspire students of art.

Another way of using artistic skills can also be applied in the design phase of the creation process, such as sketching storyboards to get a preview of what the game will look like: how it will be played, what scenes the player will see, what the levels and user interfaces will look like... This means that different types of artistic techniques have to be used along with an understanding of the mechanics of the game and how the interaction works.

- **Curricular content and research**

A game mechanic might require the player to use specific knowledge to overcome the game's difficulties. That knowledge can be previously presented in some way within the game itself. It could be something about the story itself (requiring the comprehension of certain literary concepts), information about historical facts, or the knowledge of physics principles such as having to predict how gravity, elasticity, and inertia will affect a character before jumping an obstacle in an action game—or it could be any kind of content we want students to learn. Any game could do the job if it has the contents we need, for example, a created game specifically by the teacher could be a very adaptive option for introducing a game in class.

On the other hand, if it is the students who create the game, they would already need to have some of that specific knowledge to introduce into the game. In other words, while the creators of the game will have to integrate curriculum content coherently within the game, the players will have a game experience that will provide them with a learning experience, perhaps giving them a new perspective for understanding a classroom lesson or a basis for classroom practice. In either case, this can be a gateway to practising another skill: research. Creators will have to do so in order to

bring knowledge into the game, while players can be introduced to a piece of knowledge and later be encouraged to seek new information.

- **Use of video game creation software and/or code writing**

Depending on the way a game is programmed, students will learn to use specific software, which may include a great variety of skills related to computing. These can be graphic edition, file management, import and implementation of graphic and audio resources, programming (either with code or other more accessible systems provided by software), etc. This part usually takes most of the time in the process of creating a video game and the possibilities for learning how to make commands are vast. Let's take Scratch software as an example, which is widely used both in schools (primary and secondary) and in non-formal educational activities. It allows young creators to put jigsaw puzzle pieces together to create commands that will define an animation, a video game, or even the behaviour of a robot.

## 2.4. A new perspective for video games in education

The expansion of video games in today's society is a consequence of the technological changes we have experienced in recent decades. These changes affect all aspects of our lives, including education, which must be aware of the world around it. In fact, it is almost impossible to understand education today if it is not connected to technological progress. Therefore, the implementation of technologies in education has to be gradual and straightforward in order to bridge the gaps between the worldview that formal education transmits and uses as a basis for teaching, and the worldview that students grow up with in an increasingly connected and technological-based world.

As video games are a reflection of those developments, as well as being part of an interconnected world where everything influences everything else, there is no doubt that video games are not only a crucial part of our present but also of **the future of education**. They are now as important educational resource as textbooks, paper-

based materials, touchscreens, or school trips, and they have become an essential part of our educational future. Here we can also add other technologies that are related to video games and that are also being used as pedagogical resources such as robotics, electronics, virtual reality (VR), augmented reality (AR), etc. They are usually a complement to video games in education, as they can be played through any of these elements as part of an expansion of interactivity that can serve different purposes. Sometimes teachers may want the students to have an immersive experience (with VR) or maybe have them program a robot that will be used to play a game on the screen. The possibilities are endless.

Earlier we pointed out that the playful aspect of video games is crucial when considering their implementation in an educational space. And that playing is a way of learning that has been theorised before in History. Although learning with video games is not entirely new nowadays, we can say that the way of using them has changed considerably, just as the role they play in today's society has changed along with technological advances. The possibilities today are broader thanks to new forms of human-machine interaction, new technologies, new sensibilities, new stories, new cultural references, and mentalities, etc. They all face a future in which the presence of video games in society, including educational spaces, is an integral part of it.

We have all heard of **educational video games**, which have been around for decades. They used to be games in which the aim was to demonstrate certain curricular knowledge such as grammar, mathematics, history… often in the form of activities that one would find in a textbook, such as a "fill in the blanks" exercise or "solve an equation" exercise, but on the screen instead of on paper and with extra multimedia elements (usually for children; since there were rarely educational games for adults). Today that has changed and the possibilities of pedagogical applications are much wider. It is important to take into account the social and economic changes around the world of video games that we have been seeing over the last decades. For instance, the average age of gamers has been rising, as many of those who played as children in the 1980s or 1990s have not stopped playing when they grew up, so they

have been demanding new content in games, new mechanics, or new ways of approaching the classics. So, as we have seen, technological advances have not progressed alone, but with the back-and-forth influence from other fields: education itself, but also art, science, industry, public debates, and even politics!

If we adopt an economic approach, we can see that the production and distribution of video games have grown exponentially which, among other consequences, has led the industry and governments to apply new age rating systems to games, like PEGI (Pan European Game Information), used in Europe, which recommends age limits and gives an idea of what kind of content can be found. Although this is a tool for parents to decide what to buy for their children, it has an impact on the production of video games: many of them can now target specific audiences with less risk of being banned than before, although of course how to regulate games as consumables is somewhat debatable. But the point is that the need for and the existence of such public debates and consequent policies is proof that video games are an ever-changing cultural reality, more than what we thought in the past.

One of the biggest influences in the world of video games is the social networking society, which in turn is the result of a constant technological change. First of all, it is important to mention how much games have increased their **multiplayer** options. Whereas multiplayer used to be just a way for two or more people to play offline, in front of the same screen, now, thanks to the technology, it is just one small option among others. Today it is possible to play with others in a way that was not possible before, with MMO games (Massively multiplayer online games) and all the realities and forms of transmedia expression that they bring to video game culture. In an educational context, technology allows a student to play with many interactive possibilities, thanks to mobile devices, game consoles, etc., which is a good possibility to consider in an educational plan. But being able to play multiplayer games opens up even more ways for students to learn, interact, and socialise while doing it. The possibilities are vast, not only because of the ways in which they can play (in the same room with a LAN connection or on a console, or from home via the Internet) but also

because of the formats games offer: there are many competitive games with many different game mechanics, but there are also co-op (cooperative) games with a wider range of ways to collaborate towards common goals than before. In the majority of cooperative games, the group wins or no one wins.

Over the last fifteen years, there has been an increase in the use of a large number of neologisms that try to define new social realities and social roles. One that we find very useful to talk about the social roles of gamers, especially in educational contexts, is the concept of the '**prosumer'**, who refers to an individual who both consumers and produces. In the case of video games, as we have described in the previous chapter, a prosumer is a player who also creates games. Thanks to technological advances, as explained above, it is possible to create video game levels, mods, or add-ons for non-creators. Over time, there has been an increase in the number of computer programs that allow anyone who does not know any programming code to create video games. Nowadays, the variety of these programs is wider and there are even applications specially created for education, such as Scratch. That does not mean that students are the only ones who can create: teachers can also create customised games and adapt them to their pedagogical line of work.

All these changes partly explain why the conception of what video games are has gone from being mere children's entertainment that had no deep place in public debate, to a form of art or cultural creation, part of a transmedia society in a constant technological change and, of course, a great tool for education. Today we live in a context in which video games are not just a toy, they are entertainment for all ages, part of exhibitions in museums from all over the world, academic studies (from neuroscience to cultural and social studies, among others), many creators of the games, scenarios, visuals, and music are recognised as artists, etc. There can be found plenty of examples of this, all around the world. There are video game museums and several main European cities (Rome, Wroclaw, Cambridge, Berlin…) as well as itinerary exhibitions and similar cultural projects.

Take a look, for example at the exhibition that took place in 2017 in the city of Sabadell (Barcelona): https://expoenjoc.wordpress.com/

Therefore, it is to be expected that their form and quality of content have changed over the years, not only because of technological advancements, but also because of social and cultural changes. This necessarily means that **the idea of how the player learns while playing has also changed**.

### Learning by playing

In many games we find today, we can find different areas of expertise working together in the same creative project. This applies to what has been called "independent video games" for the last two or three decades, since independent creators used to focus on some aspects that the industry was not interested in at the beginning, such as the **aesthetic experience** of some games or the **historical knowledge** represented in the content of a game. As these independent games and the communities around them grew stronger, so did the interest of the mainstream industry in making products that would appeal to this new audience, which was now interested in the artistic, cultural and referential value of games (in fact today, even big corporations such as Nintendo commercialise video games created by independent studios. The reality and the “independence” of those creators from the big market is more than questioned. But nobody disagrees that the scene of games has changed thanks to the contributions of these *indie* games that went out during the first years of the 21st century). This explains why the effort to include new figures such as historical researchers or transhumanist philosophers in the process of creating historical or science fiction video games respectively, has gained importance in the big industry itself. If a game reflects these or other insights, a video game can certainly be educational. But there is more. **Knowledge in video games is not just something that is conveyed by being shown, as it might be in a film or a novel, but it is also something that the player can be asked to apply in his or her actions to overcome missions and levels or to unlock achievements**.

The way we can learn by playing a game is not only the result of the juxtaposition of several **pieces of knowledge or challenges that test our skills,** such as solving mathematical equations as an objective but the **combination** of these with the game mechanics or other intrinsic aspects of the game, such as having to solve a mathematic equation to advance in a game whose objective is to unlock doors and escape from a facility, as it is done with the creation of doors in Portal 2 video game. In other words, as a player, one will enjoy and give much more meaning to a game that allows one to feel how a story progresses as one overcomes difficulties, rather than a game that tells a story between levels. Thus, giving more meaning to the experience of playing, in an educational context, translates into **the need to put certain learning into practice in the game in order to progress through it**.

### Learning by creating

There is no doubt that learners can benefit from video games within a pedagogical programme, as it is a way of getting new knowledge and skills. The creation of games also serves this purpose; as various skills are needed to realise what is a multimedia form of creation.

Above we have talked about how social changes have conditioned the ways in which we learn through games. When talking about the creation of games, it is essential to know what technology allows us to do now that was not possible before. Video game creators used to be computer scientists, engineers, and professionals with deep technical knowledge. Nowadays there are newly accessible ways to create games for students, professionals, and users in general: there is a wide variety of software that has that possibility and there are even online communities around them. Even many game studios use these pieces of software to make their creations. In educational contexts, many schools have started to use some of those with their students.

Since it is now a technical possibility, the opportunities to teach learners new skills with video games are now wider than ever before. The skills they will need or acquire

during the creation process are never given by themselves, more than one must always be combined, especially considering that video games use multimedia formats (videos, music and sounds, written language, code, interactivity, etc.). Moreover, in a creative team, not everyone has the same skills, as it is usually teamwork. So, **a video game is a result of combining the skills of different kinds of professionals or, in our case, of students working in different areas (art, humanities, science, technology, graphic design, literature, music…).** The possibilities of introducing pedagogical goals are very flexible. Depending on the game we make, some parts may have more presence than others: some games need prior historical or scientific knowledge, while others focus on visual art, or perhaps focus on original game mechanics that need careful and particular designing or programming.

It is important to note that, although the way of learning by playing or creating is not the same, depending on what our pedagogical program requires, we can use one or the other way to teach specific skills. Whatever skills or knowledge education professionals want their students to acquire, whatever their goals and timelines are, they must first choose which kind of practice is best for them. It can also be very useful for students to participate in the creation of an original video game, learning its process, and then research other games and find out how they think they were created, what areas of knowledge were involved, how certain actions were programmed, etc.

Moreover, any of these skills can be acquired in different learning contexts, either in a formal or non-formal education setting. Many of these skills have several levels of difficulty and the knowledge transmitted may also have different levels of depth. This means that the same kind of activity can be adapted to different age groups. Many young students learn, acquire new skills and awaken new interests by spending time doing something they enjoy, usually without realising it. That is why it is also important to take into account non-formal educational spaces when learning with video games. This usually leads to other educational activities in which they can apply and extend what they have learnt by playing.

### The example of an educational video game project in a school

Take a look at the case of the project “Let’s investigate and invent to be more sustainable”, that took place in the city of El Prat de Llobregat (Barcelona) during the academic course 2018 - 2019, in which both primary and secondary students created video games that teach and raise awareness about recycling and sustainability to the players. https://www.elprat.cat/actualitat/noticies/alumnes-del-prat-creen-videojocs-videos-tutorials-i-circuits-electronics-sobre?lan=en#googtrans(ca|en)

# FACTSHEET
# Video games and addiction

## Am I going to transform learners into video game addicts?

One of the common myths about video games is that players end up becoming addicted to them and end up neglecting other aspects of their life. While some extreme cases of players ending up spending all their time on games have been reported, it should not influence the decision that teachers and educators make when they introduce video games in the classroom.

## Is video game addiction real?

The debate about whether addiction to video games is real or not is still recent and it is very polarising.

First, as is the case with other negative video game myths, **gamers are used to their hobby being scapegoated** for virtually any malfunction in society. The fact that non-players tend to accuse games of causing such trouble does not help in establishing a dialogue.

Second, even though a **gaming disorder has been defined by the World Health Organisation (WHO)** in 2018, psychologists and psychiatrists do not all agree on the scientific basis for such a definition and this decision is still perceived as controversial. For instance, in 2013 internet gaming disorder had not been included as a disorder in the Diagnostic and Statistical Manual of Mental Disorders (DSM–5) of the American Psychiatric Association, but as a topic that needed further research (Haelle, 2019).

Finally, **gaming disorder would only concern a small percentage of players,** although this percentage does not seem to be established yet. For most people,

playing video games, whether online or offline, does not cause them to suffer mentally, socially, and behaviourally (Brigham Young University, 2020).

### Do I risk making my students play too much?

Some games are created to be played indefinitely, others are created to be played as one would read a book: there is a clear start and a clear finish to the game, and you could come back to some parts of it from time to time as you would enjoy reading your favourite pages in a book.

Some games or moments in a game can require a lot of focus, make the player feel strong emotions, or be frustrating because they are difficult.

Source: Technology vector created by freepik - www.freepik.com

These inherent aspects to games can make the player tired, and most games invite them to take breaks from time to time (either through explicit messages, by offering to prepare before an important battle, by distributing checkpoints or saving points throughout the game, etc.).

Similarly, if you invite your students to play games or review game material as part of an activity or exercise, whether in class or at home, it is unlikely that they will develop

a gaming disorder. After all, you will not ask them to stay online for 16 hours to develop a city or space station in a massive online multiplayer game (MMO). The task you will propose will have a clear objective, and it is likely to contain a time constraint, especially if it is done in class. In addition, playing for oneself and playing for the class is not the same: even if students develop an interest in the game you propose, they are unlikely to spend their whole time playing it.

### Players and non-players should be more conscious of player retention mechanisms

Some games can appear 'addictive' to non-players because they can lead or encourage the player to play regularly, or for several hours. As long as the player has fun and stays in control of such mechanisms, they do not lead to addictive behaviours.

The business model of some games is built on player retention mechanics that prompt the player to come back regularly. For instance, a player who connects every day, even without playing, for several days in a row could get rewards in a game (points, new powers, skills, etc.). Others require to join groups to complete tasks together at the same time. Some of these mechanisms aim to make the game fun (e.g., playing with others), but others are created by marketing teams for the game to generate more revenue.

Such mechanisms, when the player is not conscious about their impact, might not make the player clinically addicted, but might blur the line between playing for fun or playing because one has to, or because the game forces them to.

Organisations linked to events such as the Safer Internet Day (https://www.saferinternetday.org/) can provide interesting information to understand and discuss these topics. For instance, Childnet.com (UK) in English: https://www.childnet.com/teachers-and-professionals/hot-topics/gaming

# FACTSHEET

## Overview of 7 skills that video games can sharpen

Playing and creating video games can contribute to the development of 7 interesting skills for the school and professional environment.

Source: Abstract vector created by vectorjuice - www.freepik.com

| SKILL | PLAYING GAMES | CREATING GAMES |
|---|---|---|
| Project planning | Resource management games, for instance, require players to carefully plan their strategy. | It is necessary to plan and follow steps to create the different aspects of a game. |

| | | |
|---|---|---|
| Teamwork | Teamwork is necessary to play cooperative games to achieve goals together! | Different skills and roles are necessary to create a game, and they need to be coordinated. |
| Writing and storytelling | Most games offer a backstory and characters: they can inspire players. | It is necessary to create characters and a story to create a game. |
| Definition of game mechanics | All players prefer different game mechanisms: understanding more about them helps them play games better! | Game design requires creators to think about challenges in a logical way |
| Computational thinking and problem-solving | Some games, such as Dreams on PlayStation or Scratch, train the player to develop games. | Creating with game creation software or programming both requires thinking about the process logically and understanding how game and computer logic works. |
| Creativity and art | Games include expression in different artistic languages and educate the player about their aesthetics. | Creativity and art are necessary to create the visuals, music, and texts of a game! |

| | | |
|---|---|---|
| Curricular content and research | Games can require players to research information either in the game or outside the game to overcome obstacles. | Research is necessary to create a game, both to get inspiration from existing games or to research curricular content. |

# FACTSHEET

## Can video games replace a teacher?

In this guide, we write about all the advantages to encourage teachers and educators to use video games in their classrooms. Some could even wonder whether video games could do the teaching for teachers, or whether video games could replace formal education altogether. While this may sound surprising to some, it is good to put it into perspective by remembering how this question arises whenever a new technology is brought into education. Think about how it has been said that computers, robots, tablets, or artificial intelligence could replace teachers or even schools.

The answer, of course, is that video games cannot replace a teacher. Educational video games could in theory provide information to students, and offer them to complete exercises and tests. But a teacher's job is not just about giving lessons and testing students.

Even when we write that games are interesting to allow students to develop soft skills, we do not mean that they are the only tool to do so, and games can rarely evaluate the development of such skills.

Also, as with any other tool, one method might work to teach some students but might not work as well for others. Therefore, video games, even educational games that aim to work on specific points of the school curriculum, should not be considered a one size fits all tool. We only aim to show that video games can be one of the myriad tools that teachers can use in their pedagogy, along with all the tools that they are already using.

# CHAPTER 3

## VIDEO GAMES AND THE DEVELOPMENT OF KEY COMPETENCES AND LEARNING TO LEARN

The use of video games in the classroom has increased exponentially for the last twenty years. Video games allow students to experience virtual worlds where they will be able to acquire as well as apply knowledge of specific content/field, practice, develop skills and key competences, and enhance their critical thinking while at the same time they are in a safe environment. As Squire (2005) has concluded, video games make learning fun and capture learners' attention as they explore content.

The explosion of the gaming industry has driven games into classrooms in increasing numbers. Many efforts have been made in the last twenty years, and there are specific studies which have explored the positive results of the use of games as learning tools in the classroom. In 2001, researchers found that video games could be effective as tutorials and tools for the transfer of learning while improving motivation and efficiency (Alessi et al, 2001). There were also research results demonstrating that games can capture students' attention and teach them in a manner that they find enjoyable (Squire 2004) and engaging. During the last 20 years many case studies were conducted in several educational fields (e.g., Mathematics, Physics) that found that throughout their implementation (varying in duration) students developed more positive attitudes toward the specific learning discipline.

In this chapter, we are presenting how video games can contribute to the development of key competences with a focus on the learning to learn competence.

## 3.1. Key Competences and Learning to learn

### 3.1.1 Introduction

According to the Official Journal of the European Union C 189/7 (COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning), key competences are those which all individuals need for their fulfilment and development, employability, social inclusion, sustainable lifestyle, successful life in peaceful societies, health-conscious life management, and active citizenship. These competencies can be developed throughout our life (lifelong learning), at a continuous

pace spanning from our childhood to our adult life. They can be developed in a formal setting (e.g., school, university) as well as in a non-formal or informal learning setting (e.g., family, workplace, local communities).

The EU Council is proposing that all key competences should be equally important, as each one of these plays an important role in a successful life within our society. According to the EU Council Recommendation, the development of key competences will lead to the acquisition of important skills like critical thinking, problem-solving, teamwork, communication and negotiation skills, analytical skills, creativity, and intercultural skills as these skills are considered embedded in the key competencies.

The proposed Reference Framework sets out eight key competences:

- Literacy competence,
- Multilingual competence,
- Mathematical competence and competence in science, technology, and engineering,
- Digital competence,
- Personal, social, and learning to learn competence,
- Citizenship competence,
- Entrepreneurship competence,
- Cultural awareness and expression competence.

In Gaming4Skills we will present how video games can contribute to the development of key competences with a specific focus on Learning to Learn competence.

### 3.1.2 Learning to Learn Competence

Learning to learn has become a political priority in the educational context and beyond, due to the link between the development of this key competence lifelong learning and

the knowledge economy and social cohesion. But how can we define Learning to Learn?

There have been many attempts in the last years to define the concept. Stringher (2006), identified 40 different definitions of learning to learn. So, we can understand that there is a complexity in the definition of this concept. This is because learning to learn competence involves concepts and approaches that involve metacognition, socioconstructivism, socio-cognitive and socio-historical approaches, lifelong learning, and assessment studies.

For the Gaming4Skills Project, the consortium will follow the recommendations of the European Council, which recommends a European Reference Framework on Key Competences. According to the KEY COMPETENCES FOR LIFELONG LEARNING — A EUROPEAN REFERENCE FRAMEWORK recommended from the EUROPEAN PARLIAMENT AND OF THE COUNCIL on 18 December 2006, key competences for lifelong learning, and one of the 8 recommended key competences was the Learning to Learn. The definition that was proposed to follow according to the framework was:

> "Learning to learn' is the ability to pursue and persist in learning, to organise one's own learning, including through effective management of time and information, both individually and in groups. This competence includes awareness of one's learning process and needs, identifying available opportunities, and the ability to overcome obstacles in order to learn successfully. This competence means gaining, processing and assimilating new knowledge and skill as well as seeking and making use of guidance. Learning to learn engages learners to build on prior learning and life experiences in order to use and apply knowledge and skills in a variety of contexts: at home, at work, in education and training. Motivation and confidence are crucial to an individual's competence."

Source: Official Journal of the European Union L 394/10 (RECOMMENDATION EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 on key competences for lifelong learning)

In 2018 the European Council updated the Recommendation on Key Competences including an updated definition of the Learning to Learn Competence, which was named "Personal, social and learning to learn competence". Below we present the detailed definition of the Learning to Learn Competence that is presented in the Recommendation.

### Personal, social, and learning to learn competence

Personal, social, and learning to learn competence is the **ability to reflect upon oneself**, **effectively manage time and information**, **constructively work with**

**others**, **remain resilient and manage one's own learning and career**. It includes the ability to **cope with uncertainty and complexity**, learn to learn, **support one's physical and emotional well-being**, **maintain physical and mental health**, and **be able to lead a health-conscious**, **future-oriented life**, **empathize and manage conflict in an inclusive and supportive context**.

**The essential knowledge, skills, and attitudes related to this competence:**

For successful interpersonal relations and social participation, it is essential to **understand the codes of conduct and rules of communication** generally accepted in different societies and environments. Personal, social, and learning to learn competences would also require **knowledge of the components of a healthy mind, body, and lifestyle**. It involves **knowing one's preferred learning strategies**, **knowing one's competence development needs, and various ways to develop competences, and search for the education, training, and career opportunities and guidance or support available**.

Skills include the ability to identify one's capacities, focus, deal with complexity, critically reflect, and make decisions. This includes the **ability to learn and work both collaboratively and autonomously and to organise and persevere with one's learning, evaluate and share it, seek support when appropriate, and effectively manage one's career and social interactions**. Individuals should be resilient and able to cope with uncertainty and stress. They should be able to communicate constructively in different environments, collaborate in teams, and negotiate. This includes **showing tolerance, expressing and understanding different viewpoints, as well as the ability to create confidence and feel empathy**.

Competence is based on a positive attitude towards one's personal, social and physical well-being and learning throughout one's life. It is based on an attitude of collaboration, assertiveness, and integrity. This includes respecting the diversity of others and their needs, and being prepared both to overcome prejudices and to compromise. Individuals should be able to identify and set goals, motivate themselves, and develop resilience and confidence to pursue and succeed at learning throughout

their lives. A problem-solving attitude supports both the learning process and the individual's ability to handle obstacles and change. It includes the desire to apply prior learning and life experiences and the curiosity to look for opportunities to learn and develop in a variety of life contexts.

Source: Official Journal of the European Union C 189/7 (COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning)

### 3.1.3 The Benefits from the development of the Learning to Learn competence

According to the up to now literature review we could conclude that the Learning to Learn competence is contributing to the development of the following aspects:

- Renewed self-motivation
- Gain critical thinking
- Be creative
- Recognition of personal interests and goals
- Improvement in other personal and professional skills (e.g., collaboration, teamwork, task management)
- Improved self-confidence

By developing the Learning to Learn competence someone could benefit from the acquisition of skills in order to manage and organize the learning procedure, within groups or individual contexts, as well as to have the needed time management, be able to solve problems, and achieve deeper learning as well as to self- assess the knowledge, and be able to apply it in different contextual frameworks (Letina, 2020).

The Learning to Learn competence encompasses both the cognitive and affective dimensions and indicates its transversal nature and its lifelong and continuous dimension. The basic knowledge, skills, and abilities that can be gained from

developing this competence are presented in Table 1 (Letina, 2020).

**Table 1:** Basic knowledge, skills, and attitudes which are part of the learning to learn competence (credit Alena Letina, 2020).

| KNOWLEDGE | SKILLS | ATTITUDES |
|---|---|---|
| Knowledge and understanding of different learning methods, strengths, and weaknesses of their learning skills.<br><br>Knowledge of educational opportunities and understanding how decisions during education lead to different professional careers. | Ability to self-regulate learning, effective management of learning time, autonomy, discipline, perseverance, and information in the learning process.<br><br>Ability to concentrate in longer and shorter periods of learning.<br><br>Ability to think critically about the goal and purpose of learning. | Positive attitude towards learning and readiness for further development of learning to learn competence, motivation, and confidence in one's success during learning.<br><br>Positive attitude towards learning as an activity that is important for the life of any person and for the development of initiative for learning.<br><br>Flexibility in the learning process. |

## 3.2. Why Video Games can help the player Learn

### 3.2.1 Learning to Learn and Video Games

One of the aims of the Gaming4Skills project is to explore and propose ways to develop Key competences and especially the Learning to Learn Competence through the use of video games. Knowledge nowadays may apply to different environments as

well as demanding circumstances. A learner will need to acquire skills that range from critical thinking, creative thinking, learning to learn, and self-regulation to empathy, self-efficacy, and collaboration as well as using ICT (information and communication technology) in several forms and devices.

Reviewing the literature as well as the provided research on the field, shows that video games can be developed properly for educational purposes or could be used as such, following specific educational and pedagogical approaches as well as educational sequences. Though it has to be very carefully designed when someone would like to use video games in the classroom or in general for educational reasons. The learning environment of video games should follow specific characteristics (Zap and Code, 2009) in order to achieve the educational goals, to increase the motivation and the interest of the learner. Hence, an important aspect of using video games, to achieve the contribution to the development of the Learning to Learn Competence, is a very careful design of the game environment.

Some of the important aspects could be the following:

- Should include a simulation of a real-life context in order to allow students to be in a safe environment without real consequences, while taking decisions
- The acquisition of transferable skills should be achieved through engagement activities for students
- Inquiry and observation-based approaches should be included in students' learning activities
- Students should develop empathy through role-playing activities so as to be able to explore and understand the variety of ideas and opinions
- Collaborative environments within a video game should be provided in a way that all the participants will be able to achieve the same levels of knowledge (with mentoring and coaching from their teachers/educators)

In this respect, video games can contribute to the development of all the aspects of

learning to learn competence.

In the 21st century, traditional education and teaching processes in the public, private, and businesses have begun to disappear, as this type of schooling is not sufficient for today's conditions and expectations. Teaching processes have changed positively by graphic designs in video games and so technological innovations have taken a more important role in the teaching process (Miller, 2015).

Figure 1 illustrates the aspects of the Learning to Learn competence that could be developed through the use of video games.

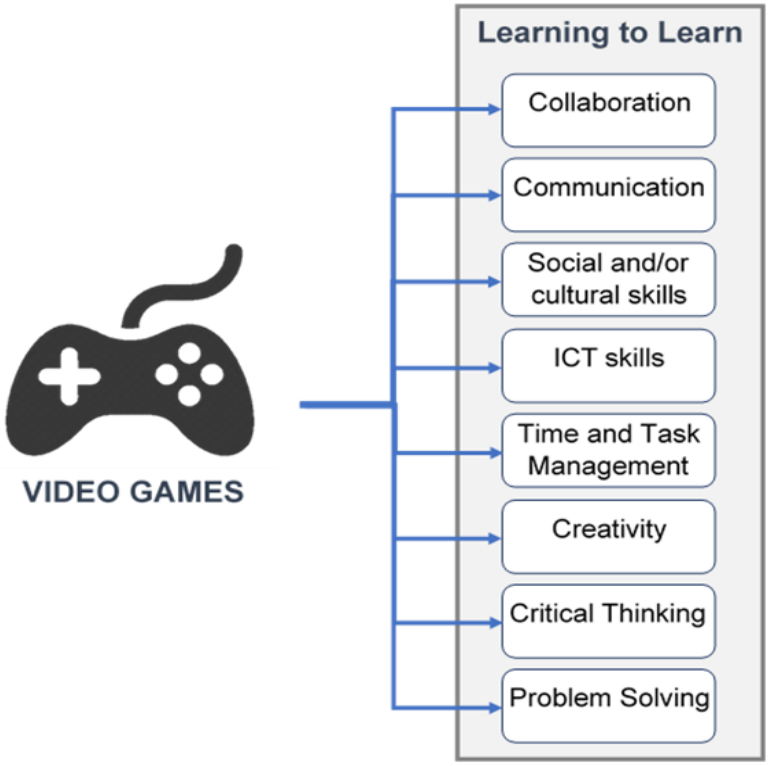



**Figure 1:** The aspects of Learning to Learn competence that could be developed through the use of video games.

### 3.2.2 Video Games and the Development of Key Competences

In the recent report of OECD (2020), What Students Learn Matters, results are presented from the OECD countries showing the importance of key competencies, and at which level these are included in the curricula and the educational systems. Many of

the 21st-century competencies outlined in the OECD Learning Compass 2030 are highlighted in countries' visions for students and student profiles.

In Figure 2 we can observe that the "Skills, attitudes and values for 2030" are already well represented in mapped curricula. Critical thinking (66%) followed by problem-solving (59%), Learning to learn, crucial to navigate an uncertain future and widely seen as a key competency for lifelong learning, is also well represented on average across countries/jurisdictions (36%) followed also by the co-operation/collaboration at the same level.

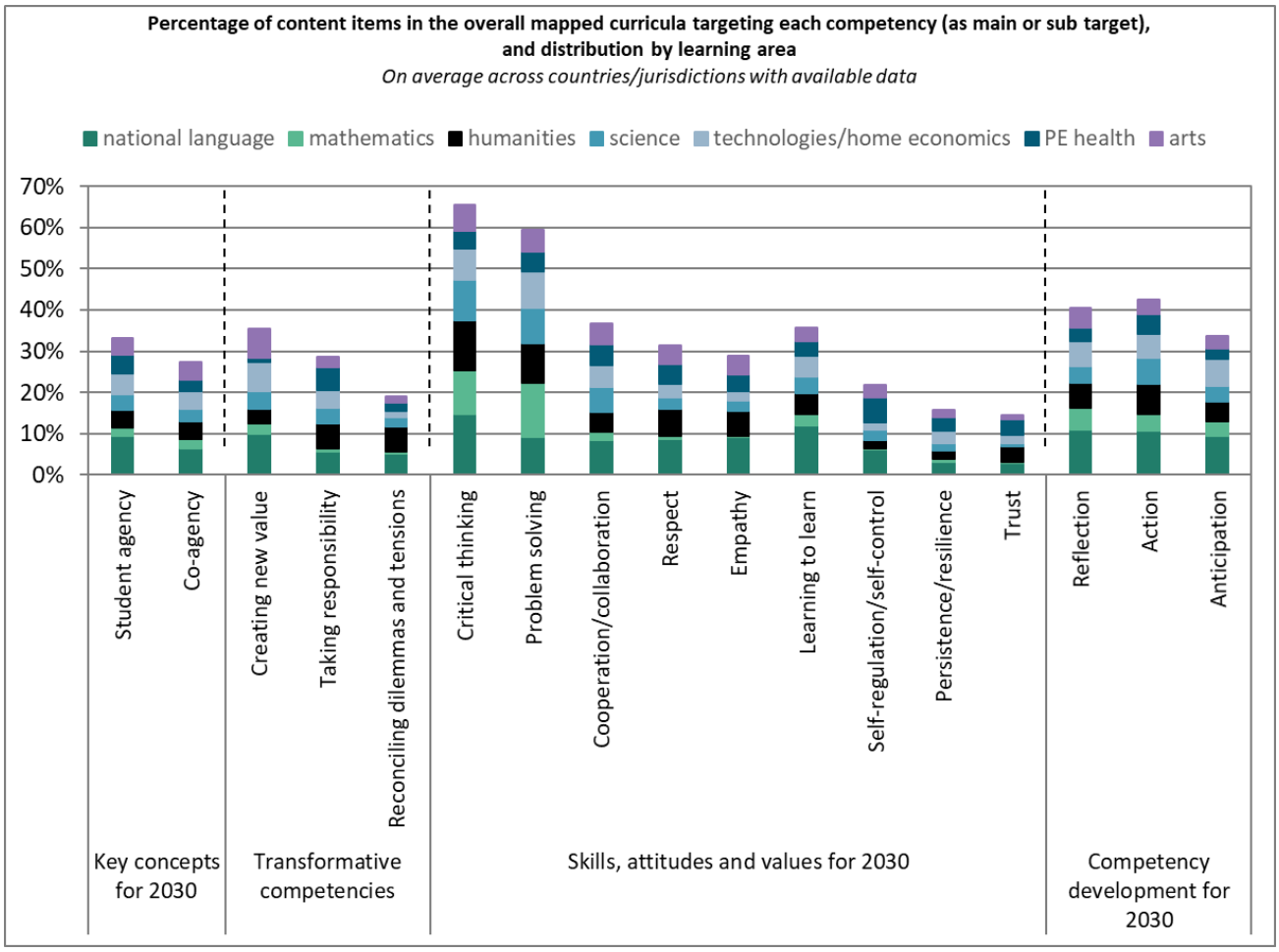



**Figure 2:** What Students Learn Matters - © OECD 2020

As we have already present in the preview sections, video games can contribute and enhance the development of the Key Competences (see figure 1). As OECD's results are demonstrating, countries' curricula have already started integrating aspects of the key competencies.

The acquisition of these key competences and skills could be achieved through the use of video games. While they enable players to immerse themselves in rich imaginative worlds, collaborate or compete with friends or other gamers around the world, they pose significant intellectual challenges, specifically on how to process and understand information, solving problems, develop strategies and plans, and interpreting information (verbal and visual) from different points of view.

There are several examples from teachers that have used games in the classroom and they have observed a significant improvement in several key skills such as problem-solving and analytical, social, intellectual, spatiotemporal skills, as well as an increase in concentration, interest, and motivation. The same examples concluded with positive results in respect to the contribution of Video Games to the development of creativity and innovation, among the students who participated. Furthermore, several Governments around Europe either think or have already established the procedures to introduce video games into the curricula. For example, the government in Poland, since the school year 2020-2021, has already introduced the video game "This War of Mine" by 11-bit Studios. This video game is already placed on the official school curriculum for high school students in Poland and was made available for free to support the teaching of sociology, ethics, philosophy, and history.

Belgium's Flanders was the second European government to formally launch initiatives to integrate video games into the curriculum (ISFE, 2020).

Recent research by the UK National Literacy Trust has found, among other results, that playing video games can support young people's literacy, creativity, and empathy. A survey of 4,626 young players aged 11-16 revealed that 79% read material related to video games, including in-game communications (40%), reviews and blogs (31%), books (22%) and fan fiction (19%), while 35% believe playing video games makes

them better readers. 63% of them on regular basis are writing content related to video games, specifically from them, they write video game scripts (28%), advice to help fellow players (22%), fan fiction (11%), and blogs or reviews (8%). Furthermore, more than half (56%) of parents said their child had chatted with family and friends as part of playing a video game during the lockdown and 60% felt that this communication contributes to their child's mental wellbeing.

## 3.3. Learning through play

### 3.3.1 Video games as a learning tool

The existence of very well-structured educational systems is crucial to ensure that every European citizen is equipped with key competences and basic skills for lifelong learning. It is therefore necessary for educators to be involved in continuous professional development. In EU countries, the professional development of teachers could empower them to acquire necessary skills to help their students become digitally competent and guide them to explore and creatively interact with technology. Only 39.4% feel confident to use digital technologies for teaching. As a result, video games can support this educational reform.

According to the several research initiatives over the last 20 years on the field of Game-Based Learning, it is evident that, given the right environment, skills, knowledge, and attitudes can be improved through Game-Based Learning (GBL). Video games can be used as a complementary tool to traditional learning but not replace it. Most teachers nowadays seem to have an interest to incorporate GBL into their lesson plans, but they lack the knowledge and level of skill required to implement this effectively.

However, to be transformative, teachers need to have the knowledge and skills to take full advantage of the process and the outcomes of these project-based activities. In addition, the role of teachers and teachers' trainers, parents, and learners will all need to shift as scientific inquiry enables new types of learning experiences. Building

capacity for teachers and school leaders, through professional development activities, is vital for successful transformation. A successful change strategy requires professional development, feedback, and support for teachers.

Even if several research initiatives have already proved the educational benefits of video games, their integration in the educational system is still very low due to barriers ranging from teachers' capacity and schools' technological infrastructure to countries' policies as well as the price of video games (del Pozo 2017).

Video games can be used in the learning procedure as structured educational sequences to teach specific parts of curricula, explain principles, involve the learner in problem-solving activities, as well as provide practical guides of concepts and rules that would be difficult to realise in the real world. Video games can include and intrinsically implement well-known pedagogical concepts. They include high intensity of interaction, specific goals, a continuous feeling of challenge, and a sense of engagement which are concepts that have been associated with effective learning environments. Hence, video games could be proved capable of reform the teaching methods in the educational system.

The practices that have already been analysed (European Schoolnet, How are digital games used in schools? (2009); Okur, M., and Aygenc, E. (2018); OECD, What Students Learn Matters: Towards a 21st Century Curriculum. (2020)) confirm the positive impact of the classroom use of digital games. Though, are still limited to specific pilot activities, so is a more in-depth analysis, including cases where the use of digital games did not match the teacher's expectations, will be required to produce more reliable results. For this potential to be fully realised, several recommendations are put forward: to develop the evaluation of practices, reconsider games following finding from recent research on cognitive approaches, to develop specific approaches and educational activities based on video games to support the reform of education systems, to enhance the collaboration between the games industry and schools, and to pilot approaches based on video games educational activities in European level.

### 3.3.2 Understanding video game engagement

Research findings support the potential of video games to develop other cognitive aspects crucial to the learning process, particularly in formal educational settings, such as executive functioning or selective attention (Ashinoff, 2014). Evidence from several years of implementation with school communities are supporting the integration of video games into the curriculum (de Freitas et al., 2013), however, the adoption of video games as a pedagogical tool in learning environments directly depends on the attitudes of all stakeholders and how they could be engaged in this approach.

Engaged educators and students, can fully support the use of video games as an educational tool and to be considered as a valid approach in the learning process, supported by strong scientific evidence, which can frame its wider adoption as an educational sequence or intervention (Carla Sousa & Conceição Costa 2018).

Research, also, has shown that video games engage the player on multiple levels by providing rewards, obstacles, stories, role-playing characteristics, and increasing levels of difficulty as the gamer increases their skills in the game.

Educators, programmers, software developers, corporate and military trainers, health care professionals, and creators of entertainment technology can use several existing frameworks for understanding the success of video gaming in developing engaging environments. Effective and engaging learning environments, could be created by providing clear and challenging goals for the users to practice and enhance their skills, providing them the ability to control their learning process in an innovative way.

For educational and pedagogical reasons, it is important that the students engage with the projects you would like to involve them in. To achieve that, you need to provide a balanced way to motivate them to get involved with the projects' activities. The balance should correspond to the educational goals and the learning procedure that the educator should follow to achieve the activities' aims in respect to the skills that should be developed.

It is clear that students (learners), nowadays, are using technology and particularly the

internet in almost all their everyday activities, especially in their leisure times, but also during training activities.

According to the PISA report in 2012, students were asked how often they use a computer outside of school for ten different leisure tasks. The report assumes that students who responded that they engage in those activities at least once a week, are considered frequent users of computers for that specific tasks.

According to the results of the report within the OECD countries, the most common leisure activity using computers is browsing the Internet for fun. 88% of students do this at least once a week. Participating in social networks is the next most common activity (83% of students); downloading music, films, games, or software from the Internet (70%); and chatting online (69%). More than half of students also use the Internet at least weekly to obtain practical information (66%), read or send e-mails (64%), or read news on the Internet (63%). Two-fifths of students (40%) also play one-player games on computers, while 36% play online collaborative games. Only 31% of students use computers at least once a week to upload their content, such as music, poetry, videos, or computer programmes (Figure 3).

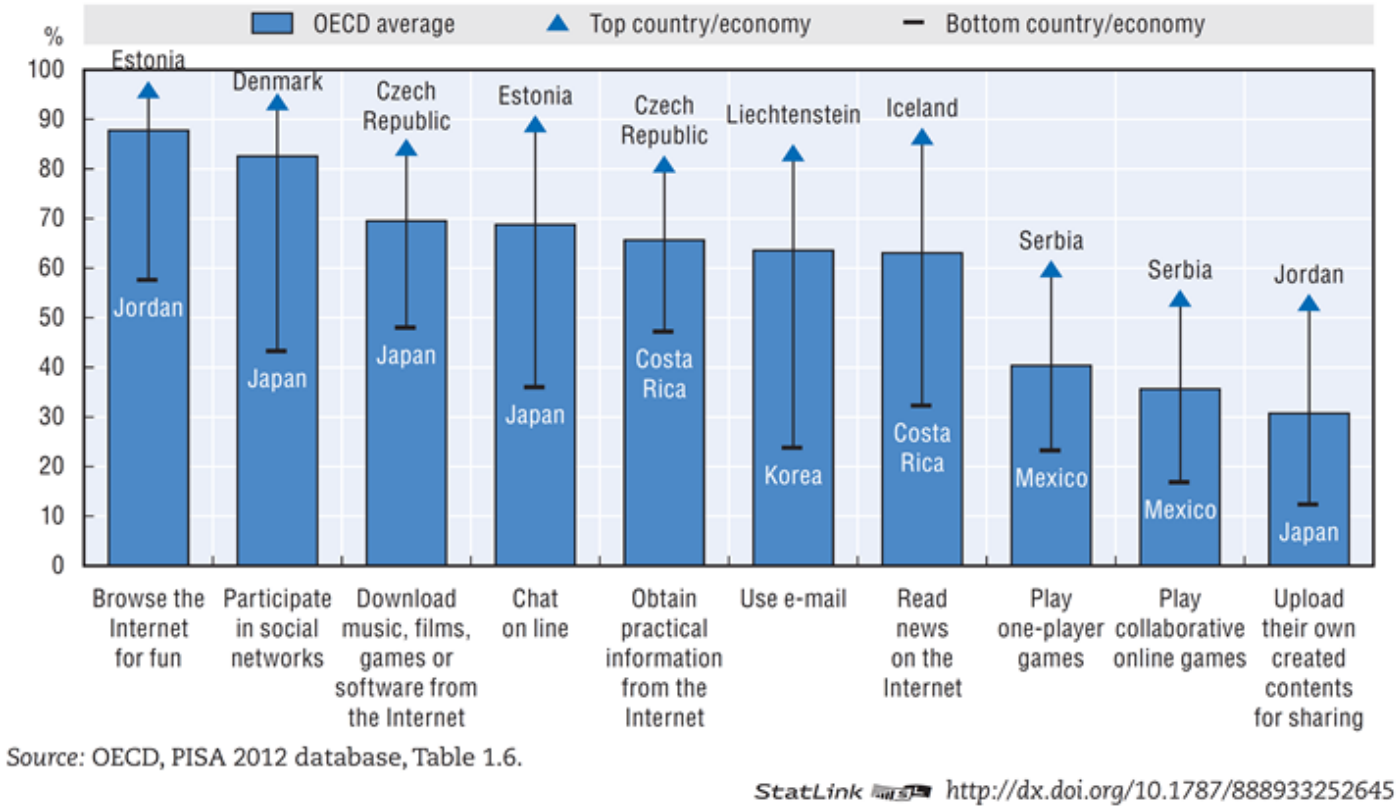



**Figure 3:** Percentage of students who reported engaging in each Internet activity at least once a week

From the above results, we can conclude that students have the trend to engage with video games as it is illustrated with the marked categories (either download games or playing in single-player and collaborative online games).

# FACTSHEET

## How can gaming contribute to the development of communication skills and empathy?

The most common image of a gamer is that of a lonely teenager spending hours on their console or computer, alone, to escape in a virtual world. This generally stems from a lack of experience in playing video games or from a limited perspective of video games.

The COVID-19 lockdowns and other restricting measures provide a recent example that shows how people of all ages can play video games to connect with others. Youngsters and adults are using video games, or virtual versions of board games, to keep socialising with their friends (Tassi, 2021).

Among the most interesting case studies of using video games in education is the case of MinecraftEdu, which allowed educators and learners to complete group activities within a classroom, especially among younger students. It was seen that in some casescollege students recreated a sense of community by recreating their campus through this activity (Anderson, 2020; Favis, 2020; Webster, 2020). Virtually any collaborative game could allow teachers to conduct similar group projects and activities with their students.

Source: Technology vector created by pikisuperstar - www.freepik.com

**But in what ways can video games allow people to connect, and, develop their communication skills and empathy?**

First of all, players often communicate when playing. A European survey in 2017 showed that 31-36% of gamers used social networking and online chat services on their consoles (ISFE, 2018). In addition, this data does not take into account playing multiplayer games with other people in the same room for instance, something which without a doubt has a risen in 2020.

Online multiplayer games require players to organise and coordinate their actions with their teams to accomplish challenges. All players' and their characters' skills should be taken into account. More experienced players can also take newcomers under their wing and explain to them how to play better. In cases of victory or defeat, it is always suggested for teams to debrief and analyse their performance in order to improve their skills and competences.

Empathy can be developed to an extent by communicating with others, but also by taking the role of a character in-game. Some games are even designed to make the player understand mental health or other personal issues by "living" the characters of the game when playing.

# MYTH
# Playing video games won't lead learners anywhere professionally

## Introducing the jobs of the video games and e-sports industries.

Among the complaints that adults tend to make about teenagers playing video games is that games will not lead them anywhere professionally. However, the video game market size in the EU was €21.6 billion in 2019 (ISFE, 2020), and the European Game Developers Federation represents game studios based in several European countries that employ over 40.000 people (EGDF).

In our guide 'When Video Games Meet Education', we show how video games can contribute to the development of 21st-century skills relevant to the professional world. It is true that merely playing games will not allow the player to train for a job nor to become a video game developer. Even when the general public considers jobs in the video game industry, they might only think about computer science jobs. Finally, students themselves might enjoy playing but might not see how to achieve a career in the gaming industry. Here is a quick overview of three types of careers related to video games.

## Jobs in computer science and design

When thinking about a career in video games, most of us first think about developers and designers. These jobs tend to be further specialised in the gaming industry, with specific skills tailored to games. Even for a developer, it is important to train themselves to develop games as early as possible because there can be different jobs, such as game designer, level designer, quality tester, etc.

Several designers work on a video game: animators (2D and 3D) can have

specialisations related to faces, characters, landscapes, vehicles, etc; sound designers can be music composers or work on ergonomy; user experience specialists work on the interface and controls of the game. For those wishing to pursue these careers, understanding what these jobs entail in the video game industry is important.

Source: Business vector created by jcomp - www.freepik.com

## General careers specialised in the video game industry

Video game companies prefer professionals in general careers such as marketing, human resources, sales, and licensing, to name a few, to have some form of expertise about their industry. This expertise is generally acquired through experience for now, but specialisation courses could also appear. These more general careers could be interesting to consider for youngsters interested in this industry who would prefer something general in this industry instead of choosing a too specialised field.

## A rising sector: careers in e-sports

E-sports is a rising industry in Europe. Globally, it was worth $650.6 million in 2019 (ISFE, 2020). It consists of team competitions on multiplayer video games. The best e-sports team become professional and work in similar ways to sports clubs, with sponsors and specialised agencies managing the teams and organising their events,

to name just a few their activities. This sector is still developing its economic model in Europe but it is consolidating and it represents new opportunities to work in jobs related to video games.

It is important to note that e-sports players need to invest a considerable amount of time training and managing their career, as any professional sports player would. It is not a casual job that anybody could pick up.

# CHAPTER 4

## HOW TO ENGAGE AND INTEGRATE ALL STUDENTS

Teachers and researchers agree that **students need to be engaged to learn effectively and achieve academic success**. Student engagement can be seen in many different ways: participating in class, asking questions, or losing track of time while being immersed in a certain activity. It can, however, be **difficult to find the right teaching methods** to engage all students as the students in a classroom are different in "ethnicity, socio-economic background, home language, gender, special needs, disability, and giftedness" (Alton-Lee, 2003). So, teachers need to keep in mind the very different skills, needs, and interests of their students when it comes to finding the right way to engage them. In this chapter, we will focus on how video games can help to engage and integrate all students. We will first examine what it means to engage students in learning, then look into how students with different learning abilities can be engaged, and finally discuss the effects of video games on students' achievements.

## 4.1 What does it mean to engage students in learning?

### 4.1.1 Defining student engagement

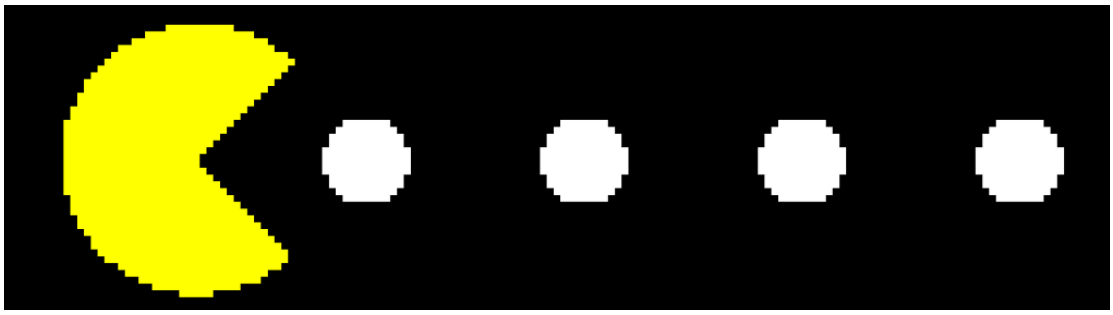
Before discussing how we can engage students in learning, we have to understand what it means to engage students. Student engagement can be described as "**commitment to and investment in learning**" (Kortering & Christenson, 2009). In general, we can say that students engage in activities that generate their interest and the desire to succeed.

However, **engagement in learning occurs on multiple levels**. We can define four dimensions here mentioned by Davis et al (2012) and Macklem (2015). You should pay attention to each one of them, as they are interconnected.

1. **Behavioural engagement** describes participation in tasks.
2. **Emotional engagement** is related to the emotions that students experience in the classroom.

3. **The cognitive engagement** has to do with the students' investment in thinking.
4. **Relational engagement** is linked to the relations of a student to their teacher and classmates.

**Using video games in class can correspond to all four dimensions** as they require active participation, implicate players emotionally, push students to think differently about specific concepts, and can improve the teacher-student relationship. You should, however, make sure to understand your students' preferences and habits related to video games before introducing them in class to benefit from the engaging effect that results from adapting to the interests of your students.



Visual by Perlinator

### 4.1.2 Counteracting boredom at school with video games

Students experience various emotions while learning and receiving instructions. These emotions are called academic emotions and they influence the students' learning process and academic performances. One of these emotions that is often neglected when investigating students' academic failures is boredom. According to multiple studies, **between 40% and 66% of students regularly experience boredom in the classroom**. Boredom can come from the inability to self-regulate attention, thus being a cognitive problem, but it can also be a motivational problem, which could be remedied by simply finding ways to motivate and engage students in the learning progress (Macklem, 2015).

Motivated and engaged learners are more likely to complete school. As a result, reducing boredom in schools can also contribute to reducing early school dropout. This is especially important for **students who have a specific learning disability** or other cognitive impairments because they are much more likely to disengage (Kortering & Christenson, 2009).

The high levels of boredom in schools could also be explained by the fact that learners have changed due to the shift to the **digital era** and therefore **need to be motivated differently**. As video games correspond to nowadays students' experiences, they can have a strong motivational force (Prensky, 2005).

They can also have a positive effect on students' academic emotions: learning is generally easier while having fun rather than when being bored.

### 4.1.3 What affects students' engagement in learning?

In addition to students' learning abilities, health and nutrition, cognitive capacity, relationships, and stress level are amongst the factors affecting students' engagement. These are reinforced by the student's background, which makes reaching disadvantaged students even more difficult. According to a PISA study from 2015 conducted by the OECD, students' motivation to achieve is closely linked to their background and socio-economic status. "In almost all countries and economies, disadvantaged students have less motivation to achieve than advantaged students do" (OECD, 2017).

On average, **motivated students score the equivalent of more than one year of schooling higher** than their least motivated peers. It is, therefore, crucial to find ways to include and engage all students. Video games might just be an answer to this engagement problem as they have a motivational and implying effect on their users and correspond to the contemporary culture of young people, no matter their socio-economic status (De Theux, 2015).

## 4.2 How to engage students with different learning abilities

### 4.2.1 Strategies for engaging students in learning

As we have already mentioned at the beginning of this chapter, good student-teacher relationships have a positive impact on students' engagement. However, teachers also need to give their students some space, because motivation decreases in a classroom where the teacher is too controlling. Giving frequent directives, not allowing critical comments, or interfering with students' learning pace is generally counter-productive when it comes to engagement (Macklem, 2015).

We can identify **three basic factors that enable students' engagement**. Students need to be able to:

1. **contribute** to their learning,
2. **personalise** their learning to their strengths, needs, and interests and
3. have some **ownership** of their learning.

All of these factors can be identified in video games, which is part of what makes them engaging (Przybylski et al., 2010).

### 4.2.2 Engaging students with specific learning disorders (SLDs)

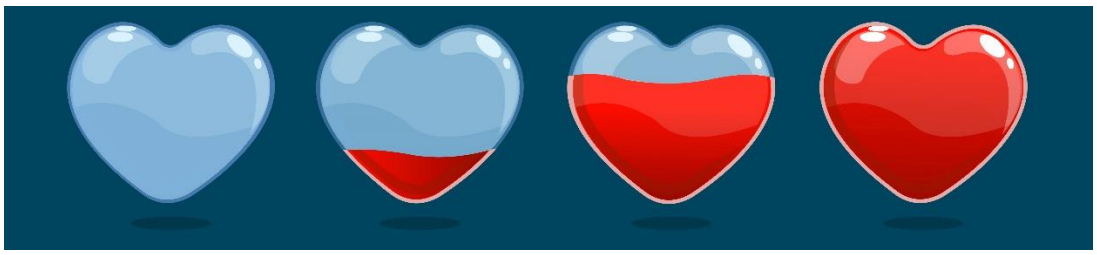
As was already mentioned, advantaged students are usually more easily engaged than disadvantaged students, but a classroom is rarely full of advantaged students. Statistically, there will be around **three children with learning disabilities** like dyslexia, dyscalculia, or ADHD **in a class** of 30 students (University College London, 2013). That is why we will focus on how to spark students' engagement especially for students with learning difficulties.

When it comes to engaging students with specific learning disorders (SLDs), five dimensions are important (Seo et al., 2008 and Kortering & Christenson, 2009):

1. **Instructional quality**: Instructions should be as cohesive, flexible, and deliberate as possible. Combining several approaches can be beneficial as only one approach is unlikely to be engaging for the whole class.
2. **Responsiveness to students' needs**: Flexibility is particularly important when it comes to responding to the needs of every student. Teachers should respond quickly to student errors and try to anticipate academic problems.
3. **The socioemotional climate of the classroom**: Creating an open, positive and supportive classroom environment implies building relationships with your students and encouraging peer support. It also encompasses accepting mistakes as part of the learning process and emphasising student effort instead of focusing on mistakes.
4. **Student autonomy**: Whenever students are provided with choices that are incorporated by the teacher, their engagement generally increases.
5. **Providing links** between the subject matter and students' every-day-life.

Whereas the instructional quality depends on the teacher, video games correspond to all of the mentioned dimensions. **Video games provide the player with choices** (autonomy) **and immediate feedback** (responsiveness to students' needs).

They can contribute to a positive class environment simply because they are **fun** and can provide a link between school and the outside, where many children know and enjoy playing video games in their free time. Video games thus clearly have the potential to become a useful tool to engage students with all kinds of different learning abilities.



Source: Gold vector created by macrovector - www.freepik.com

### 4.2.3 How to engage all students in learning with video games

Because of their inherent motivational nature, video games can naturally contribute to motivating students. They involve the learner directly as video games need the player to be active. Moreover, video games can be a tool for **engaging students from various backgrounds** in learning as video games are oftentimes more popular and accessible for disadvantaged students than other media and can thus help reconnect some students with the school system (Annart et al, 2019).

Regular studies confirm that using video games in the classroom induces motivation and implication in students. The students' feedback often includes that they feel more involved and they mostly connect positive emotions with the experience (De Theux, 2015). Using **a tool, they know well from outside of school** that breaks with the usual school setting can have a strong motivational effect on students and strengthen the teacher-student relationship. According to teachers' experiences, most of the students are surprised and their initial enthusiasm mostly spreads to activities other than playing, keeping even the trouble makers among the students focused on the course. As using a video game in school is a new activity for most students, some of them might develop a certain closeness to the subject in which a video game is introduced (Vincent, 2018).

Video games are very **adaptable tools** and can therefore be used to enhance motivation among all learners, including students with specific learning needs. They can be played at the student's rhythm, thus, avoiding feelings of stress, anxiety, or

boredom. The digital format is also very practical for students with certain learning disorders like dyslexia as traditional learning methods like reading and writing are more difficult for them. Additionally, research has shown that video games can positively influence the development of certain skills like reaction time, decision making, social skills, and spatial abilities as well as increase concentration in people with intellectual or behavioural disorders (Brown et al., 2013 and Griffiths, 2002).

You should however keep in mind that video games can also present **challenges** for students with special educational needs. Depending on the type and grade of impairment, these challenges can concern the physical manipulation of games as well as the ability to learn the rules or determine appropriate actions in specific situations in the game. Written information in the game or limited time for decision-making and exchanges with other players can also be problematic. Yet, video games remain attractive to children with SLDs as they can foster certain skills like mentioned before and promote self-confidence. As failure is a natural part of a game, playing can help students with learning disorders to positively respond to setbacks and motivate them to acquire challenging skills (Durkin et al, 2013).

## 4.3 The effects of video games on student achievement

### 4.3.1 The benefits of video games to support the learning of all students

Using video games that your students know can help them relate to a certain subject matter and spark participation because they can **mobilise more easily prior increasing their knowledge on the specified topic**. Students do not have to play the game necessarily; the visuals can be enough to help in making them understand specific concepts. Video games also have several engaging characteristics that we have already described in the previous chapter, which can be used to positively influence the engagement and consequently the achievements of all students.

The inherently motivating nature of video games can be used to make learning abstract concepts more hands-on and fun.

This is especially true for students with learning disorders as learning is an extra challenge for them. Having fun during an otherwise arduous process can be a very welcomed change. Moreover, video games are all about being active and controlling the game's outcomes through active choices. Controlling the situation can be a good feeling for students who are usually rather lost in class, which in turn will increase their motivation to learn and **spark positive emotions**. While DYS students might usually experience more negative emotions like frustration or anxiety in class, video games can affect students' emotions positively through their narrative force and in-game music. Video games also present challenges and are often rather competitive, which improves participation, achievement, and motivation in all students (Annetta et al., 2008). Moreover, failure is a natural component of a video game. This aspect can be particularly beneficial for students with learning disorders because they can **learn to accept failure** as a natural part of the learning process instead of as something to be avoided at all costs.

Source: Logo vector created by freepik - www.freepik.com

### 4.3.2 The role of the teacher for engaging students with video games

We have already seen that introducing video games in the classroom usually comes with an initial positive reaction of surprise and enthusiasm from most students. However, **not all students will be thrilled** at the prospect of using video games for learning. You should not assume that all youngsters like to play video games in their free time. Even among the ones who do, their video game cultures can vary greatly.

According to teachers' testimonies, students – especially girls – who do not play video games at home and who do not have academic difficulties are less likely to be very engaged at the beginning. The fear of bad grades because "they do not know how to play" can hinder them. In this case, it is important not to use the game itself to evaluate your students' performances, but instead make it clear that the game is only used as a supportive tool in the educational process (Vincent, 2018). The same applies to students who have poor ICT skills or who are reluctant to play because of other reasons. It is always a good idea to talk to your students first and **get to know their video game culture** to be able to **adapt the use of digital games in your class to your students' ICT skills** and different capabilities. Choosing the right game, and deciding how to use it must be well thought out. The game needs to be in line with the course material and has to be used with a specific objective. For guidance regarding these practical aspects, you can have a look at our guide "Practical approach to video games in the classroom".

The involvement of the teacher, however, does not stop there. The role of the teacher is a crucial one during the whole process. Using video games can only spark student engagement when the **teacher provides the right framework** for it and actively accompanies the process.

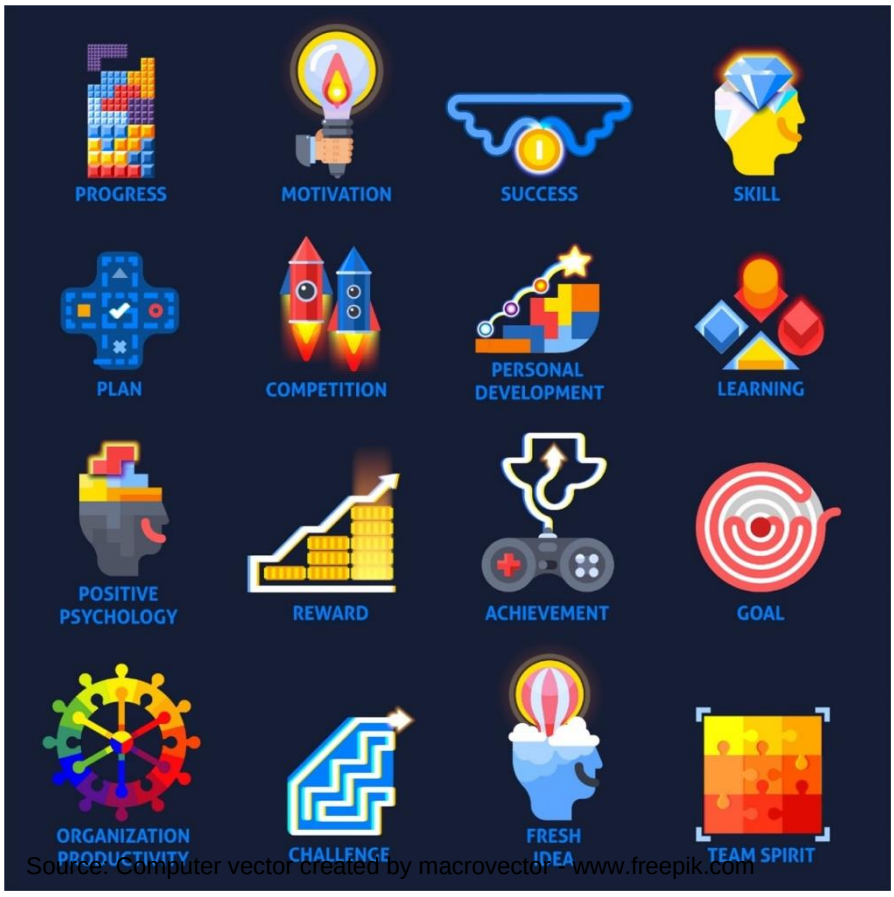
Video games alone are intrinsically motivating, but only for playing, not for learning. The role of the teacher is crucial to enable the learning process by playing a video game. Studies have shown that an educational video game alone is not useful for engaging students in learning. The teacher needs to direct their students for them to be able to engage in learning through the video game (Tay & Lim, 2011). "**Video**

**games motivate to carry out a learning activity but the motivation to learn, the meaning of this learning, remains in the hands of the teacher**, the facilitator, the group" (Annart et al., 2019). So, video games are by no means a magical solution for student engagement, but under the right circumstances, they can be a useful educational tool.

### 4.3.3 How do video games affect student achievement?

Besides or even because of their engaging nature, video games are often said to influence student achievement negatively. We want to make some room here to make this clear: **playing video games is not the reason for reduced academic achievements**.

Studies so far have found that the use of videogame at home has very little influence




Source: Computer vector created by macrovector - www.freepik.com

on students' performances. In fact in some studies, a slightly positive effect was noticed. One example is developing visual-spatial skills or improving the reading ability of dyslexic children. However, more research is needed in this field (Dewar, 2018).

As you will have noticed while reading through this guide, video games are quite versatile. When used appropriately, they can be great **educational tools to engage students in learning and can therefore have a positive effect on students' academic achievements**. Video games can also have many other benefits like improving students' digital skills. They can be used to develop so-called 21st-century skills like problem-solving, decision-making, or cooperation as well. Playing video games can even help children in the development of personal identity or a scientific mindset (Khine, 2011). Moreover, playing video games can have a positive impact on visual attention, memory, and visual-spatial skills as players develop a mental map of the game environment while playing. Hand-eye coordination and the ability to simultaneously perform several activities – so-called multitasking – can also be supported by playing video games (Berry, 2011). This potential of skill development is of course as attractive for typical learners as for children with learning disabilities.

## Conclusion

To conclude, children from disadvantaged socio-economic backgrounds or with specific learning disorders can equally benefit from the use of video games in school. Therefore, video games have great potential to **engage and integrate all students, even those that are usually more difficult to reach**. As student engagement is a prerequisite for academic achievement, video games can truly be a great educational tool. Of course, the video game remains a **tool that needs a teacher** for providing a framework to enable learning, explanation of concepts, and guidance, because as Vincent (2018) put it: "It is not a question of learning by playing, but of learning through play."

# FACTSHEET

## How to engage all kinds of learners with video games

Video games can be great educational tools to **engage and integrate all students in learning,** even those that are usually more difficult to reach because of special educational needs or disadvantaged socio-economic background.

Visual by Memed_Nurrohmad

This is because video games:

- are **adaptable**. Students can advance at their own pace, preventing feelings of frustration or boredom.
- are **fun**! This helps to create a positive learning environment and makes students feel good while learning.
- provide instant **feedback**. Students do not have to wait for several days before getting back their results on a test but can adapt their strategy instantly according to the feedback they receive.
- make **failure** a part of the process. Students can learn accepting failures and try again through play, which can also boost their self-confidence.

All of these factors lead to increased engagement in learning, which in turn can have a **positive effect on students' academic achievements**.

When using video games to engage different kinds of learners, you should:

- **Adapt the use of digital games to your students' ICT skills** and not assume

that your students are great with anything digital.

- **Choose the video game carefully.** Find out about your students' video game culture beforehand and try to anticipate challenges (e.g., fine motor skills or too fast decision making required).
- **Not use the game directly to evaluate**, but only as a support.
- **Guide your students** and provide a framework to enable active learning through play.

# FACTSHEET
# Is there a relationship between playing video games and ADHD?

## Do video games 'give' ADHD?

It is no wonder that the myths that games make players violent and addicted are even more highlighted when players have attention disorders with or without hyperactivity (ADHD), as people with ADHD can react more impulsively and can have more difficulty in managing their reactions and emotions. The use of screens, in general, suffers from a negative image regarding its impact on ADHD, even though research and practice have proven it can also have many benefits.

But what is ADHD? First, it is a disorder: it means that 'ADHD is not a disease but a neurodevelopmental disorder characterized by a set of symptoms (…). As such, people do not "catch" ADHD, and it does not get "cured"' (Empower Me, 2020). It is characterised by an attention deficit, with or without hyperactivity and impulsivity.

Therefore, as per the definition, video games cannot "cause" ADHD since it is a disorder, not an illness.

## How can games contribute to a better sense of wellbeing?

Games are leisure activities, and as such, they can contribute to a greater sense of wellbeing. Playing games can also be a good way to take breaks, and to canalise and evacuate negative emotions. They can absorb us into their world and make us release some steam by allowing us to focus on the challenges they offer. This can be a good tool for those who have difficulties in focusing and in managing their emotions, such as people with ADHD. Using a timer can be a good way not to end up playing longer than

planned for those who might lose track of time.

Of course, stressful or frustrating gaming sessions can make the player more stressed than before. It depends on the players, on the game, and everybody's experience and tastes.

Generally, playing games has a positive impact on mental health and wellbeing because it allows us to take breaks and rewards us for completing challenges without any strings attached (Hern, 2020).

Source: Computer vector created by vectorjuice - www.freepik.com

# FACTSHEET

# Will girls play video games if I bring them to the classroom?

Misplaced myths about women and technology in general, also transfer onto video games. As the proportion of women among computer science and engineering degrees declined over the past 20 years (Miller, 2017; Girls Who Code), the idea that computer science was not for women has strengthened. This has in turn contributed to the perception that girls do not play video games, and that video games are not for women.

## Aren't female players a minority?

Girls who play video games are not a minority: in Europe, 45% of video game players are female (ISFE, 2020). Even then, the image of the women who play video games is that they tend to play casual mobile games. In 2018, 44% of female gamers played on consoles (6% less than for men and women overall), 54% on computers (similar to the overall statistics), and 63% on mobile devices (compared to 48% for men and women) (ISFE, 2019). While a bigger share of female gamers plays on mobile devices, the difference among mobile device players overall is not that big, as women represent 51% of all mobile and tablet video game players as of 2019 (ISFE, 2020).

Source: Infographic vector created by pch.vector - www.freepik.com

## Do girls only play games ‘for girls’?

Since the 1990s, some games have been designed to target a young female audience, and some mainstream games tend to attract a bigger share of female players. However, this distinction seems to be less and less relevant for the industry. For instance, ‘Animal Crossing: New Horizons’, is a farm management game with cute characters, which would be perceived as being ‘for girls’. Yet, the gender demographics of this game are now becoming balanced.

## What games should I choose that everybody enjoys?

As a teacher, you should not base your choices of video game on gender considerations, but first and foremost on your learning objectives, in the sense that your primary goal should be to create a more engaging approach to a lesson topic. You can discuss with your students to know whether they like a game, as with any other cultural product, one might prefer some types of games over others.

# FACTSHEET

# Can video games 'cure' dyslexia?

## What are SLDs?

Specific learning disorders (SLDs), are also known as "dys" disorders, such as dyslexia, dyspraxia, dyscalculia, etc. They are disorders which mean that their effects can be mitigated with treatment but they cannot be 'cured' since they are not illnesses. As they can make reading, writing, speaking, and calculating more difficult, they make school activities more challenging to students with SLDs (MOOCDys).

## Could video games help develop the academic skills of learners with SLDs?

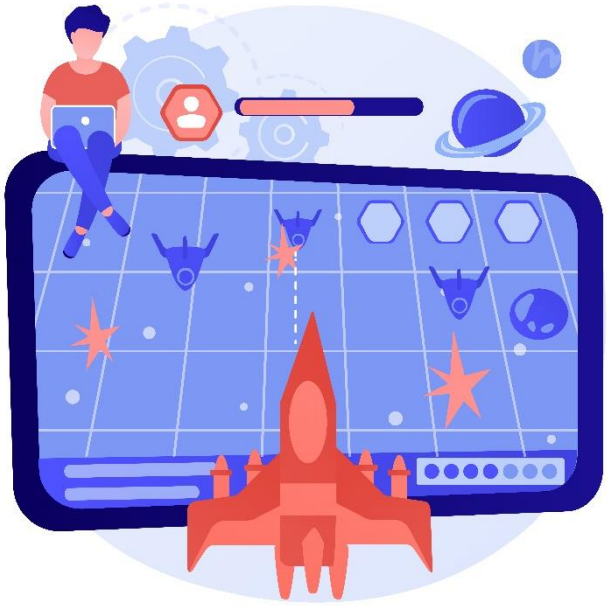
In the early 2010s, a few papers have suggested that the effects of dyslexia on students' reading abilities could be undone by making learners play either action or rapid spelling video games. Studies which used action video games found that playing raised youngsters' attention skills and allowed them to read faster thanks to the need to develop motor skills and perception to play the game (Franceschini et al., 2013). There are also other programs which target rapid reading more specifically (APA, 2014).

Yet, a more recent study (Luniewska et al., 2018) has failed to replicate the results of the previous studies. According to the new study, neither action nor phonological video games help children with dyslexia read better.

Finally, most experiments seem to focus on dyslexia while ignoring other learning disorders, although it is not rare for people with one learning disorder to have another disorder.

**Stay open to students' thoughts**

Video games should not be considered magical tools that could make disorders disappear nor treat dyslexia or other learning disorders completely. That being said, it is possible that some of your students might feel more confident in performing some tasks at school, even just focusing, after playing video games. It could be thanks to the stimulation of playing or thanks to being in an environment in which they felt safe to try and fail. Others might not feel the same. Stay open to the feedback you receive from your students and to their individual experiences!



Source: Blue vector created by vectorjuice - www.freepik.com

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