GAMES in schools

USING VIDEO GAMES IN SCHOOL

Guidelines for successful learning outcomes

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Introduction

Welcome to the Games in Schools Handbook – a resource for schoolteachers who would like to use video games in their classrooms. The handbook provides you the background knowledge you need to get started with using video games for educational purposes. It offers plenty of examples in the form of pedagogical approaches to use, interesting games to explore and resources to guide you. The handbook is relevant for schoolteachers of students of all ages, ranging from early years education to upper secondary schools.

The Games in Schools Handbook covers key themes such as 'why use video games for educational purposes' and 'why it is important to talk about video games', and pedagogical scenarios of when and how to use video games. This includes using video games in thematic project-based learning, using games to develop students' literacy and other skills, and how game design offers plenty of learning opportunities for children and young people. The handbook also highlights how video games can support inclusive education and what teachers need to do to counter some of the stereotypes that exist in and around games.

The Games in Schools Handbook was developed together with the Games in Schools Massive Open Online Course (MOOC) offered by the European Schoolnet Academy and can be used in combination with the MOOC resources. Most chapters in the handbook correspond to learning modules in the MOOC, so that after reading a chapter, you can explore more ideas or see what your peers have to say about the chapter topic by browsing through the MOOC videos, forum and Padlets. Links to the MOOC resources and other relevant materials are provided at the end of each chapter.

Throughout the handbook, you will find plenty of examples of useful video games to try out, available at the time of writing (2023). For more examples contributed by teachers from across Europe and beyond or even to add your own ideas on a specific topic, visit the MOOC forum or Padlets.

The Games in Schools Handbook was produced with the kind support of Video Games Europe.

About the authors

Ollie Bray has over 25 years' experience in all aspects of education. As well as his philanthropic, school and systems leadership work, he has also been an award-winning headteacher, a senior policy advisor to government (digital learning strategy) and Scotland's national advisor for emerging technologies in learning. He previously held the position of Global Director for Play and Education at the LEGO Foundation and currently acts as the Strategic Director at Education Scotland.

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Chapter 1:
Why use video games in education?

'People love to learn; people love to play. It should not have taken quite so long to make progress towards putting those two together seamlessly.'
Professor Stephen Heppell

Introduction

Good teachers have always used games and play in their classroom, from the 'play-based' curriculum of early years education to the multiple-choice games and simulations found within many primary and secondary school classrooms. Learning through play has been a feature of good education systems for many years.

How we play and how we learn through play has evolved over time. This has included developing specialised tools to help support physical play, including manipulative toys such as the Rubik's cube or LEGO bricks. More recently, we have also seen play evolve into the digital space. While play and the tools that we use for play have evolved over time, it is important to remember that different types of play do not replace one another. For example, play without objects and tools is as important as play with objects and tools, and there is a place for both digital and non-digital play. It is, however, important to recognise that using video games in the classroom is a form of 'learning through play'. We will discuss the key features of learning through play further below.

There are many reasons why video games have the potential to impact classroom experiences in positive ways, including:

★ Video games are a form of **play.** That gives us **intensity** and **involvement.**

★ Video games are a form of **fun.** That gives us **enjoyment** and **pleasure.**

★ Video games have **rules.** That gives us **structure.**

★ Video games have **goals.** That gives us **motivation.**

★ Video games have **problem solving**. That sparks **creativity.**

★ Video games have a **story**. That gives us **emotion.**

★ Video games have **interaction**. That gives us **social groups.**

★ Video games have **outcomes** and **feedback.** That gives us **learning.**

(List adapted from Robertson, 2006)

Furthermore, across the world there is growing acceptance that the purpose of schooling must be more than just getting children and young people to learn facts through rote learning and that modern education systems need to develop knowledge, skills and attributes in equal measure if young people are going to thrive in the 21st century and beyond. The World Economic Forum 2020 Future of Jobs Report lists 10 skills that it thinks will be the most important in 2025. They all fit neatly into the subcategories of problem solving, self-management, working with people, and technology use and development. The European Commission's framework of Key Competences for Lifelong Learning includes digital and interpersonal skills. The LEGO Foundation refers to holistic skills and defines them as physical skills, social skills, creative skills, emotional skills and cognitive skills.

Skills such as those mentioned in the frameworks above are often best developed through engaging and immersive experiences, which are supported by good learning and teaching approaches (pedagogy). Learning through play approaches (including learning through play with video games) have a key role in developing, encouraging and promoting these holistic skills from the early years and throughout life.

In recent years, learning through play with video games has started to become a recurring feature of classrooms around the world, with many educators recognising the potential of games to support and enhance learning, teaching and assessment.

Research into the use of video games in the classroom

There is a growing body of research that explores the potential of video games for learning, teaching and assessment on the basis of evidence coming from a variety of theoretical perspectives.

In his seminal book, ***What Video Games Have to Teach Us About Learning and Literacy (2004),*** Professor James Paul Gee focused on the learning principles in video games and how these principles could be applied to traditional classroom settings. Gee (2004) explained that:

'Video games can be used as tools to challenge players, when they are successful. They motivate players to persevere and simultaneously teach players how to play the game. These games give a glimpse into how one might create new and more powerful ways to learn in schools, communities, and workplaces'.

In their paper ***The impact of console games in the classroom: Evidence from schools in Scotland (2010)***, Groff, Howells and Cranmer concluded the following:

★ Game-based approaches present an excellent opportunity to engage students in activities that can enhance learning and produce a range of educational benefits;

★ Game-based learning approaches need to be well planned and classrooms carefully organised to engage all students in learning and produce appropriate outcomes;

★ Game-based learning approaches build on many children's existing interests, skills and knowledge and can narrow the gap between children's home and school cultures;

★ Game-based learning approaches can increase communication between parents, teachers and school leaders and enhance parental engagement in children's learning;

★ Game-based learning approaches have the capacity to increase teacher motivation;

★ Teachers often have to overcome a number of barriers and reservations about using game-based learning approaches in classrooms, however when they do so, they are convinced of the results;

★ Teachers need support from peers, school leadership and outside resources to use games well for learning and integrate them effectively.

In her book ***Reality is Broken* (2012),** Jane McGonigal showed how we can leverage the power of games to fix what is wrong with the real world, from social problems like depression and obesity to global issues like poverty and climate change. She provides some powerful examples of how certain games are addressing problems in the business, education and non-profit worlds.

In her book ***Digital Games and Learning: Research and Theory* (2014),** Nicola Whitton provided a critical overview of the field of digital games and learning from a cross-disciplinary perspective. It considered research and theory from areas as varied as computer science, psychology, education, neuroscience and game design. Whitton used findings from these areas to develop an understanding of the potential of video games for learning centred around four dimensions: games as active learning environments, games as motivational tools, games as playgrounds, and games as learning technologies.

The above examples offer an overview of some key texts, but for a more in-depth understanding of the latest research findings on the use of video games in the classroom, consult relevant research journals like the International Journal of Serious Games, the International Journal of Games-Based Learning and the Journal of Games and Culture.

Learning through play

Based on evidence of how children learn best (the science of learning), the LEGO Foundation in Denmark has identified five characteristics of learning through play (LEGO Foundation, 2017). They say that learning through play happens when the activity is experienced as **joyful,** helps children find **meaning** in what they are doing or learning, involves **actively engaged**, minds-on thinking, **iterative** thinking (experimentation, hypothesis testing, etc.) and **social interaction**.

These characteristics can be applied to both non-digital and digital play, such as video games. For example:

★ **Joy** is at the heart of learning through play with video games – both enjoying a task for its own sake and the momentary thrill of surprise, insight or success after overcoming challenges.

★ Learning through play with video games also involves being **actively engaged**. Actively engaging in learning does not mean energetic learning, instead the 'active' part of the learning results from cognitive stimulation as a result of engaging and challenging activities.

★ A game is **meaningful** is when the young person can relate new experiences to something they already know. When learning through play with video games, young people often explore what they have seen and done, or noticed others do, as a way of grasping what it means. By doing so, they can express and expand their understanding to achieve a desired outcome. Video games also bring meaning because they are highly culturally relevant for young people.

★ **Iteration** means trying out possibilities, revising hypotheses and discovering the next question, which leads to increased learning. In the physical world, from a very young age, children try different ways to build a high tower with blocks or discover how the angle of a ramp impacts how far a marble will shoot across a room. The

same is true in video games where young people can build or recreate structures or try different approaches or tactics to achieve an outcome.

★ **Social interaction** is a powerful tool for both learning and play. By communicating their thoughts, understanding others through direct interaction, and sharing ideas, young people are not only able to enjoy being with others, but also build deeper understanding and more powerful relationships. With video games, this can occur when playing a video game in the same physical space or through networked digital play.

It is very likely that these five characteristics will ebb and flow as young people are engaged in learning through play activities with video games. While not all five characteristics are necessary all the time, they are useful to help plan and evaluate impactful activities with video games that allow young people to experience moments of joy and surprise, make a meaningful connection, be active and absorbed, iterate and engage with others.

Parker and Thomsen (2019) identified several evidence-based pedagogies that have a strong alignment to the five characteristics of learning through play mentioned above. These pedagogies include:

★ Cooperative and collaborative learning are approaches designed to maximise positive peer interactions;

★ Guided discovery learning, where learners should 'expect and be prepared to discover knowledge' (Bruner, 1961) with the support and scaffolding of a teacher;

★ Project-based learning, where the project is used as a vehicle for delivering the curriculum;

★ Inquiry-based learning, where the learning is interdisciplinary and the work is often organised around relevant, authentic and open-ended questions.

We will discuss how different types of video games can be used for guided discovery learning and collaborative learning in chapter 2 and discuss how video games can be used for thematic project-based learning in chapter 3.

The play spectrum

There are many ways we can use play, including with video games, in the classroom, each with different roles for adults and children, and each posing different demands on the players. The dynamic nature of learning through play with video games has led to some debate about appropriate ways to organise learning with video games in the classroom. There are researchers who maintain free play as the 'gold standard' and argue that adult roles should be limited or non-existent. Others view guided play (where adults hold a supportive role), or structured play (where adults are prescriptive about the learning activity) as more appropriate for classroom activities (Jensen et al., 2019).

Zosh and colleagues (2018) propose that this friction is keeping the field from developing a more nuanced notion of play that encompasses its dynamic and changing nature. Instead, they suggest that play should be viewed as a spectrum rather than a static concept.

The table in the following page shows the key features and possible benefits of different types of play on the proposed play spectrum. While some video games fit neatly into individual categories, other video games can fit into all four categories depending on how they are used in the classroom.

	Structured play	Games with parameters	Guided play	Free play
Key features	Teacher initiates and directs. Young person follows. More structure and less choice.	Context provides structure and choice within game rules.	Adult initiates and child directs. Balanced structure and choice.	Child initiates and directs. Less structure and more choice.
Benefits	Well-planned and intentional instruction with use of effective techniques can lead to improved outcomes when young people are required to learn specific pieces of knowledge.	Well-designed video games can lead to improvements in literacy, numeracy and cognitive skills. Rhythm and movement games can lead to improved self-regulation. Some games can also support social-emotional and creative learning. See chapter 2.	Guided play can lead to improved literacy, numeracy, social skills, concept-based learning and self-regulation skills compared to instruction or free play alone. See chapter 3.	Free play is linked to executive functions, self-regulation, social skills, self-esteem, the development of spatial skills, health and well-being.
Example 1	Improving mental maths with Dr Kawashima's Brain Training. See chapter 2.	Building a bridge with Bridge Builder or World of Goo. See chapter 2.	Using LEGO Star Wars or Mario and Sonic at the Olympic Games as context for learning. See chapter 3.	Creating freely in Roblox or Toco Builder. See chapter 5.
Example 2	'Follow these step-by-step instructions to build an eco-friendly house in Minecraft.'	'Explore an eco-house built in Minecraft and record the key features.'	'Working as a class, let's independently research and then discuss and agree on the key features of an eco-village. Then working collaboratively, let's build it in Minecraft and share what we've learned by encouraging others to explore our new world.'	'Build an eco-village in Minecraft… go!'

** The key features and benefits of using video games at different stages of the play spectrum (adapted from Jensen, et al., 2019).*

Who plays video games?

In addition to the importance of how video games can help students 'learn through play', using video games in the classroom is also important because it offers us opportunities to address a culturally relevant and economically important medium that many students (and teachers) will be familiar with and invested in.

Unfortunately, there are still a lot of myths about the video game industry and who plays video games. Firstly, there are over 3 billion video game players around the world. According to Newzoo, the industry is worth a staggering $180bn (Wijman 2022), that's more than double the film industry. In Europe, the revenue was 23bn EUR in 2022.

It is also safe to say that 'who plays video games' has expanded considerably in recent years, as illustrated by data from Video Games Europe:

- In Europe, 53 % of the population (aged 6–64) play video games and over 70 % of the population aged 6–24 play them.
- 47 % of video game players in Europe are female.
- Women represent 51 % of all mobile and tablet video game players.
- The average age of a female video game player in Europe is 32.

These statistics are useful not only to help us challenge common stereotypes about the games industry (see chapters 5 and 6), but they also reinforce the cultural relevance of video games in our society and remind us that it is highly likely that there are a lot of

educators who are also video game players. Therefore, teachers who have experience of video games can leverage this knowledge for educational purposes in their classrooms.

We will discuss stereotypes in the games industry and the demographics of the video game developer industry in more detail in chapter 5, which is about designing games.

Inclusive practice

When considering the use of video games in the classroom, it is essential to also think about the role that video games can play in inclusive educational practices and any inclusion-related challenges that come with using video games in the classroom.

Inclusion refers to how we structure our schools, our classrooms, our other learning environments and our lessons so that all our students learn and participate together. Inclusion occurs when people feel, and are, valued and respected regardless of their personal characteristics or circumstances.

For example, this means creating an environment where all children have access to digital technologies such as video games. Unfortunately, some children face digital poverty. Children, particularly from lower socio-economic backgrounds, may have unequal access to digital technologies, and therefore, are less likely to develop digital skills. For these children, their first significant access to digital technologies may be in the classroom. But using digital technologies may cause them anxiety, and deference may be given to other children who appear confident in using them. It is essential that teachers are aware of these dynamics when deciding to use video games in the classroom. However, video games can, in fact, act as a positive bridge for children facing digital poverty as they offer an easy and fun way to build their confidence with digital technologies in the classroom (Ball et al. 2020).

Lack of access to digital technologies like video games at home can also impact children's chances of leading a successful and happy life. Using video games in the classroom can therefore act as an important mechanism to support the development of key life skills. For example, playing video games has been associated with the development of problem-solving, spatial and critical thinking skills (Granic et al. 2014). Furthermore, one study found that teenage girls who play video games for more than 9 hours per week are three times more likely to get a STEM degree than those who do not (Hosein 2019). Finally, it is worth noting that for many years, some digital games have been used very successfully with children who have a range of additional support needs, including children who are neurodivergent. For example, using digital games in special needs education has been found to reduce the effects of attention deficit hyperactive disorder (ADHD) in children (Peñuelas et al. 2022).

As teachers, we therefore need to ensure that children have equitable opportunities to using video games for their learning. This can mean providing certain children with more time or opportunities to use video games in the classroom if they are unlikely to access video games at home. Similarly, there might also be children who have access to video games but are less likely to be encouraged to try them out. For example, girls are less likely to be asked to try digital technologies in different environments and therefore might also be more reluctant to put themselves forward to do so in the classroom (Southgate et al. 2019).

Luckily, in the last decade, video games have made great strides to becoming more representative and diverse in their character representation, but there is still more to be done, as we will explore in chapter 5. As teachers, it is therefore important, where possible, to select video games that are representative of the children in the classroom. Some games, such as Roblox and Minecraft, allow video game players to create and customise their own avatar that represents their personality and/or appearance. However, some video games, as with most digital media, may not be representative of the classroom or may further stereotype people. If the teacher has selected video games that may impact children's understanding of their own or others' social identities, then as teachers, we have the responsibility to explain the historical and societal influences in game design, characterisation, and the accuracy of representations. For example, there may be a lack of representation of certain ethnic groups or they are represented negatively in a game.

The accessibility of video games themselves is also a key element of inclusion and should be considered by teachers when using video games in the classroom. There are a number of technologies that have really improved the accessibility of video games and, as a direct result, make games and game play more inclusive. All of the main game consoles have accessibility features built in, which allow services like text-to-speech, magnifiers, colour filters and even dual control. Another nice example of accessibility in game hardware is Microsoft's adaptive controller and mouse that is built with inclusive design in mind. Microsoft also offers a range of 3D print files that allow you to customise adaptive accessories to very

specific user needs. Let's also not forget that many digital games are played on phones and tablets and the accessibility features such as haptics and text-to-speech on these types of devices have also improved considerably in the last decade. Video game software has also become more accessible and customisable in recent years. An increasing number of games put accessibility features at the centre of their user design, for example the new Hogwarts Legacy game opens up into the accessibility options screen to allow you to select your setting before you even get started on the gameplay. This is important as it sends a strong message that accessibility and inclusion is important and not something to be hidden away in a menu that is tricky to find.

Key takeaways

★ Research into using games in schools suggests multiple advantages of using games in schools.

★ Using video games can support the development of holistic skills.

★ Teachers should use different types of play that sit along a spectrum ranging from entirely free play to structured play.

★ It is important for teachers to be aware of issues related to inclusion and accessibility in video games.

★ The demographics that play video games are more diverse than is often assumed. However, representation of this diversity is sometimes lacking in video games.

★ When using video games in schools, it is important to be aware that some students will not have access to digital technologies at home.

★ Video games can act as a bridge for developing confidence in using digital technologies.

Further resources and chapter references

Games in Schools MOOC videos:

★ Why use Video Games,

★ How do we learn with games,

★ Inclusivity and games,

★ Further research & resources.

Influencers and groups to follow that post on the topic of inclusivity in games:

★ Women in Games: @wigj

★ Shlomo Sher: @VideoGameEthics

★ Daisy Abbott: @DAbbottResearch

★ Black Girl Gamers: @BlackGirlGamers

★ Daily Black Video Game Characters: @DailyBlackChars

★ Serious Games & Simulations @FocusGames

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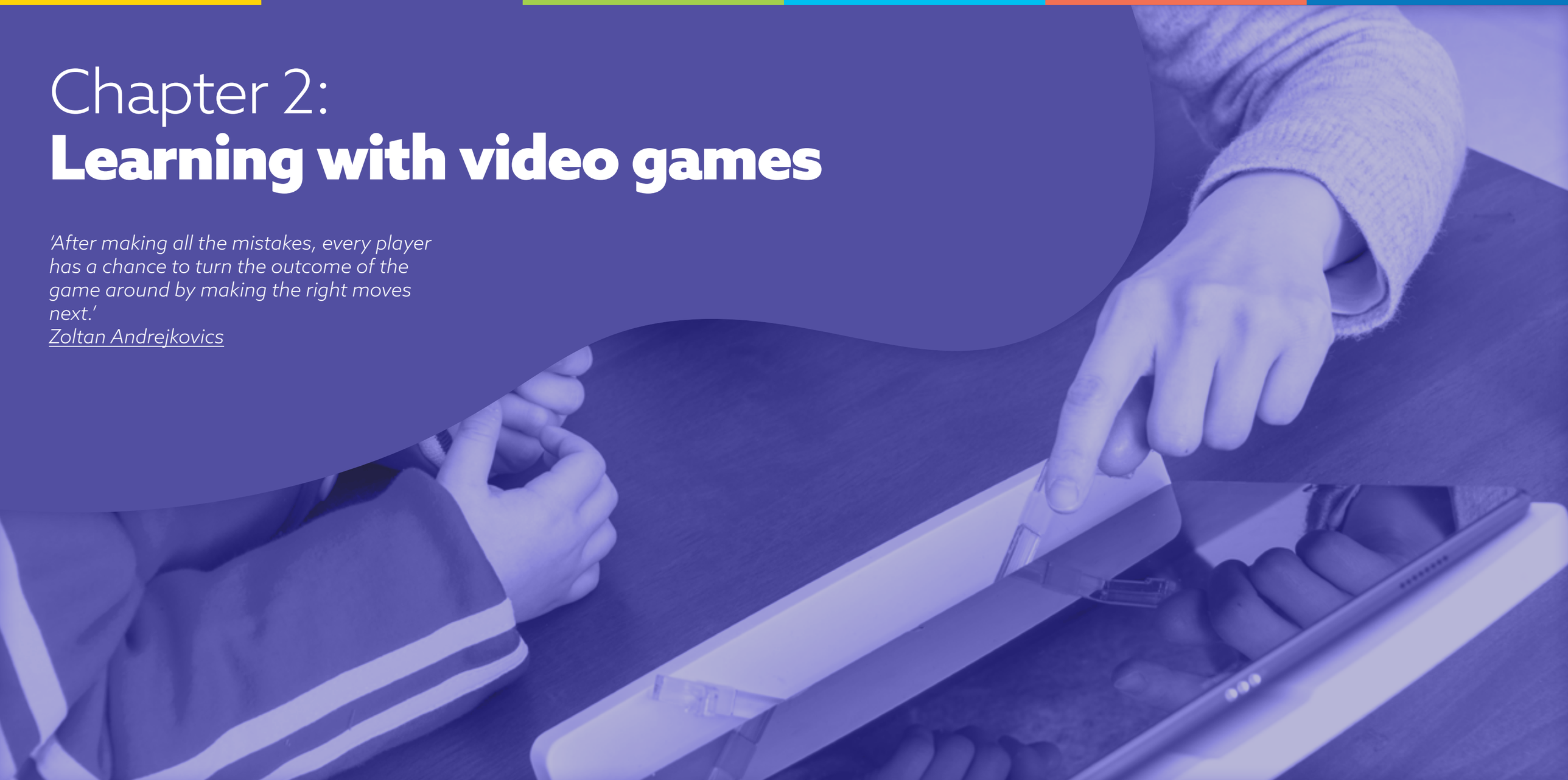
Chapter 2:
Learning with video games

'After making all the mistakes, every player has a chance to turn the outcome of the game around by making the right moves next.'
Zoltan Andrejkovics



Introduction

In this chapter, we will explore a wide range of video games that we can use for learning, some of which have been specifically designed to support learning, while others, when combined with the right pedagogy, can be used to support the development of skills and knowledge. This includes commercial-off-the-shelf (COTS) games, which are primarily built with entertainment in mind.

Before examining these games, we will briefly explore how to select video games for use in the classroom. Selecting which video games to use and when to use them can be a challenging task. One of the reasons for this is the vast amounts of video games and learning apps currently on the market. At the time of writing (2023), the Apple App Store lists over 90,000 educational apps, and while these may not all be games, there are still a lot to choose from.

It is also important to note that while some games and apps might be branded 'educational' or 'for learning', this does not always mean they are good for being used in the classroom. One of the reasons for this is that sometimes, learning games are built by game developers who have minimal educational know-how. This means they often look good, and children tolerate them, but the learning gains are questionable. The other scenario is that the games are built by educationalists, so the learning content is good, but the design of the game is poor, leading to low engagement from children and young people.

The best learning games are developed by teams of people who have real multidisciplinary expertise in child development, educational psychology, learning science and game design and, of course children, and young people themselves.

What makes a good educational video game?

There are lots of things to consider when selecting a video game for learning, including:

★ Is the game appealing, enjoyable and culturally relevant and also age appropriate? It is worth noting that research shows that the enjoyment of a game has shown to influence the attitude towards learning (Giannakos, 2013). We will also discuss how video games are classified more in chapter 6.

★ Does the game offer the opportunity to make a strong academic link – for example, to improve core literacy skills such as listening, reading and writing or to develop creative problem solving?

★ Does the game promote diversity? Games should convey a wide range of experiences to ensure that diverse and often marginalised backgrounds, experiences and characteristics aren't ignored or absent from the classroom.

★ Does the game offer opportunities to develop social and emotional learning?

★ Is the game easy to integrate into the existing curriculum? For example, using a maths game rather than a textbook.

There is also a wide variety of practical considerations when selecting video games for learning, such as:

★ What equipment will be required to play the game within or outside of the classroom? Games that work on mobile, PC or in web browsers can usually be implemented more easily than those that require a gaming console. The variations in students' and schools' access to the internet also need to be considered.

★ How many copies of the game are needed and how much does the game cost? Depending on the way the game is used in the classroom, sometimes only one game licence is necessary. For example, in a 'hot-seat' approach, one student plays at a time and the rest of the class observes. This works well for games without much player choice. For games where individual player choice is a key feature, multiple licences might be best, but could get costly.

★ How long does the game take to play?

In their article ***Putting Education in 'Educational' Apps: Lessons from the Science of Learning,*** Hirsh-Pasek. et al (2015) provide a simple framework to help us determine the pedigree of an app based on educational context and what the authors describe as **'The Four Pillars: Where the Science of Learning Meets App Development and Design'.** The pillars are active, engaging, meaningful and social. The pillars are very similar to some of the characteristics of learning through play that we talked about in chapter 1. They are designed to help identify the potential of educational apps and could equally be applied to video games.

Video games that support the development of numeracy skills

Numeracy and cognitive games are designed to improve your cognitive or brain functioning ability. They are sometimes called brain training games. The term 'brain training' was made famous by a computer game. The game was called ***Dr Kawashima's Brain Training: How Old is Your Brain?*** It was first available for the Nintendo DS back in 2005 and is currently available (2023) for the Nintendo Switch and as a popular iPad or iPhone app.

Similarly to other brain training games, game play involves a set of exercises to improve attention, memory recall and spatial awareness skills prompted by a virtual assistant – Dr Kawashima. Results of a randomised control study published in the British Journal of Education Technology by Robertson and Millar (2009) showed a positive impact on numeracy in terms of accuracy, speed of processing and the speed at which less able children were able to improve their mathematical ability. The research also showed a significantly improved attitude to school in the young people using the video game.

Other brain training apps that are popular with schools include **Peak Brain Training,** which focuses on language, mental agility and attention; **Elevate,** which has more than 30 mini games that test memory, focus, maths, cognitive ability, apprehension and a whole range of other mental skills; and **Cognito,** where you have been selected for a spy mission and have to take part in a number of brain training tests. Practitioners should also not overlook more traditional brain training games that have been digitised, for example **Sudoku**.

A summary of the key features of each of these apps can be found below:

Dr Kawashima's Brain Training for Nintendo Switch:
24 mini games designed to reduce your brain age and make you more cognitively active. Games and challenges are gradually unlocked the more you play and regularly practise. Completing various mini games contributes to your 'brain age' score that you are trying to reduce, from a maximum of 80, to 20.

Peak Brain Training:
45+ mini games and activities divided into the six categories of memory, attention, problem-solving, mental agility, language, coordination and emotion control.

Elevate:
40+ mini games designed to improve focus, memory, processing, maths, precision and comprehension. Includes performance tracking to measure your performance against yourself and others.

Cognito:
80+ mini puzzles set in the context of a spy mission and designed to improve adaptability, focus, memory, reasoning and speed. Uniquely, this app also pulls in health information from connected apps such as steps and sleep data.

Example of classroom implementation

Brain training apps work best in the classroom when linked to regular practice.

Examples of regular practice might include:

- 10 minutes at the start of each school day.
- 15 mins three times a week after lunchtime or break time.
- 20 minutes twice a week as part of a regular home learning or homework activity.

As stated above, brain training apps work best in the classroom when linked to regular practice, rather than project work or extended one-off use.

Numeracy and cognitive games are often designed to be competitive. Sometimes, this competition is between the player and a game character and sometimes between the player and themselves, where they try to improve times, high scores, etc. Networked games can also create competition between the player and other players including peers and classmates.

Competition at different levels often leads to a social response, where young people want to improve, resulting in practice, improvement in techniques and consolidation of learning. The interesting thing about video games is that while they are often competitive, many are competitive in a non-threatening way. In many video games, the only person the child is trying to beat is the computer or themselves, which means that many video games do not have the same stigma attached as, for example, a team sport or an activity where individuals appear to be under pressure to do well.

Video games that support the development of literacy skills

There is a good evidence base that shows that video games can improve literacy skills. Research from the UK National Literacy Trust in 2021 found that video games can:

- Give young people a route into reading and writing;
- Improve confidence in young people's reading skills;
- Immerse young people in stories;
- Engage boys and reluctant readers in literacy;
- Support positive communication with family and friends.

Often, games that develop more generic literacy skills are commercial off-the-shelf (COTS) games. These are games that have often been built for entertainment but have strong educational alignment.

For example, video games offer the opportunity for players to develop reading in different ways at different levels and across different genres. These types of games include simple narrative-driven games like **Florence,** which is essentially a linear 20-chapter hand-drawn digital story book with intermittent mini games to keep the reader engaged. Each chapter features a different portion of Florence Yeoh's life, telling the story of a relationship, following the usual stages of loneliness, meeting, dating, falling in love and moving in with another person.

Other games have more advanced dialogue and are not linear in nature, allowing the reader to explore and interact with the story in different ways. A good example of this is **Mutazione,** where you play the role of a 15-year-old girl visiting her grandfather on a faraway island inhabited by friendly but mutated villagers. By finding seeds, tending to gardens and talking to people, you uncover a tightly knit web of characters with unrequited love, hidden trauma and difficult memories. By tending to the people as well as the gardens, you nudge the island towards processing its losses. This is also a good game to teach representation.

There are some games that are interactive graphic novels such as the **Phoenix Wright: Ace Attorney** courtroom murder mystery series, where the player pieces together clues to challenge testimonies and uncover the truth. Because the text arrives in 'bite-sized' chunks, long stories seem to be more accessible and less intimidating to reluctant readers.

While narrative driven games such as Florence, Mutazione and Phoenix Wright can encourage reading through self-directed learning, they also provide an opportunity in the classroom to develop a range of other literacy skills. For example, character studies, character development, plot analysis and writing styles.

Other games also help develop literacy skills, for example games like **Thousand Threads,** which helps players think about the power and consequences of words, or **Storyteller,** which is a puzzle game that provides a set of tools and scaffolding to develop and tell your own stories. Other games that help improve vocabulary include **Scribblenauts,** which consists of a series of puzzle games that the player solves by typing or writing the names of everyday objects so they appear in the game to let them progress.

As well as reading in games, children can also read around games. This is because video games often create worlds that spawn secondary texts. This can include official novels that expand the world or guidebooks that offer instructions and help. For example, **Knights and Bikes** is a hand-painted adventure on a fictional late-80s British island. Players work together to explore its coast on bikes to find treasure, mystery and trouble. Knights and Bikes also has spin off books, a cartoon series and even recipes to read and create.

Video games can also offer routes into books. For example, **Beast Quest** offers a range of video games as an easy first step into the Beast Quest worlds. This leads to young people then reading the more complex and longer narrative in the books themselves.

The key aspects of literacy that are developed through the above games are summarised below.

Key aspect of literacy	Video game title	Example of classroom implementation
Encourage reading through narrative-driven video gameplay	★ Florence ★ Mutazione ★ Phoenix Wright: Ace Attorney	Students read and play one chapter/section of the game as part of a home learning task. During class time, they discuss story and character development and review difficult vocabulary.
Encourage reading traditional texts as a result of video game play	★ Knights and Bikes ★ Beast Quest	Students play video games in class (e.g. 10 mins a day) and this is used as a first step to encourage them to read more complex narrative books on the same theme. Students are asked to make the recipes associated with the game (Knights and Bikes) as part of a home learning task.
Develop vocabulary skills	★ Thousand Threads ★ Scribblenauts	Students keep track of game vocabulary and problem-solving to design their own imaginary game levels or puzzles for others to solve.
Develop storytelling skills	★ Storyteller	Students use storyteller to create and re-mix new stories based on game prompts. They use their creations as a stimulus to create a piece of extended writing.

Finally, it is worth noting that some education systems are very progressive in recognising the cultural relevance and meaning of video games in society, including recognising video games as 'literary text'. Scotland has done this since 2008 as part of their Curriculum for Excellence with the definition of a 'text' as *'the medium through which ideas, experiences, opinions and information can be communicated'* and includes video games as a type of text that teachers might want to use to improve literacy skills. In 2020, Poland placed the video game '**This War of Mine**' on the official high school reading list. This War of Mine is inspired by conflicts in the Balkans and the player is forced to make moral choices to get food, medicine and shelter. The game has been made available for free to all high schools in Poland to support teaching sociology, ethics, philosophy and history. Interestingly, it was also recently included in the permanent collection at the Museum of Modern Art in New York City.

Video games that support the development of language skills

Language apps and video games that are designed to help players learn a language other than their own have become very popular in recent years. While language apps are technically not video games, they use mechanisms commonly known from video games, also known as gamification, which we will explore further in chapter 4.

Aside from specialised apps and games, a good way to develop language skills with video games is to consider changing the language and location settings on desktop PCs or video game consoles. This is a really great way to introduce words that will feel familiar because they are associated with the location on the screen or with a character but using a different language. You can do this in your classroom or encourage it at home.

One of the most popular language learning apps for classroom use is **Duolingo.** It is also one of the most gamified apps and has options to learn over 30 different languages. The app aims to help improve vocabulary and grammar through lessons organised by difficulty and topics. Its short, interactive lessons cover vocabulary recognition, listening activities and even voice-enabled speaking practice. The app encourages regular practice with a daily streak. Research from Jiang, et. al (2022) showed strong improvement in both reading and listening scores amongst students using the app.

Two other interesting language learning apps that are popular with schools include FluentU and Babbel. **FluentU** teaches a new language through authentic media clips with interactive subtitles that explain the meaning of each word. These clips include movie trailers, news segments and scenes from popular TV series – all with interactive subtitles to aid understanding. The app also makes good use of game mechanics such as personalised quizzes and flashcards. It is currently available in 10 languages.

Babbel is one of the more popular paid apps, although you can access some of the content for free. It uses a variety of different methods to teach practical language in 10-to-15-minute sessions. These courses offer exercises for reading, writing, listening and speaking, ensuring a well-rounded language education. It makes some use of game mechanics such as leaderboards and experience points. Research from Lowen, Isobel and Sporn (2020) showed positive results in the effectiveness of Babbel for developing both receptive linguistic knowledge of vocabulary and grammar, and oral communicative ability in Spanish as a second language.

Language apps like Duolingo, FluentU and Babbel work best either as part of in-class teaching to help consolidate learning, or for extension tasks. They also work well for lesson starters, warm-up activities at the start of the day, after break time or as home learning activities.

Video games that support the development of physical or movement skills

Video games can develop physical and movement skills in young people by encouraging them to be physically active, understand movement and space through practising sensory-motor skills, develop spatial understanding and nurture an active and healthy body.

Fitness apps such as **Google Fit**, **Apple Fitness+** and **Strava** are all very popular and have gamified features such as allowing users to gain experience points, unlock levels, be on a leaderboard and get rewarded for exercising.

Besides more traditional fitness apps, there is also a range of mobile video games that use augmented reality to get players moving and exploring real-life places. These games include **Pokémon Go** and **Jurassic World Alive,** which have similar formats where players need to explore the real world to find particular Pokémon or dinosaurs and then solve puzzles or combine the things that they have found to earn rewards. Other less traditional fitness apps include **Zombies Run,** which is an immersive audio adventure fitness game that works by combining your normal walk or run with an immersive soundtrack and interactive story that helps motivate you to keep going, solve problems and keep away from the zombies.

Khamzina, et al.'s (2020) Systematic Review and Meta-Analysis on the impact of Pokémon Go on physical activity concluded that playing Pokémon Go was associated with a statistically significant but clinically modest increase in the number of daily steps taken among game players. One challenge for future physical activity interventions using Pokémon Go is to retain active engagement once the initial novelty wears off.

Electronic dance games like **Just Dance** and **Dance Central** are also popular video games used to promote exercise in schools. Some versions of these games, such as Just Dance for the Nintendo Switch, make use of controllers to track movement in game and provide individual feedback. There have been a number of studies into the impact of electronic dance on young people and the results have been similar to those found when using Pokémon Go in that dance mat exergaming schemes are associated with improved health, however there was declining support for the initiative over time (Azevedo. *et. al*, 2014).

There are also some exercise peripherals for the Nintendo Switch that support movement games such as wrist and leg straps that allow players to attach the controller to their body, sports accessories that allow them to turn their controller into a tennis racket or golf club, and the Ring-Con, which is a flexible hard plastic ring with a space for the Nintendo Switch controller. All of these peripherals allow players to transfer real world actions to in-game movements. There are several games that make good use of these peripherals, such as **Ring Fit Adventure,** which uses the Ring-Con to allow users to exercise in real life to explore a fantasy adventure world through a series of mini games. **Switch Sports** uses the sports accessories to play tennis, golf and a wide variety of other sports and **Zumba Burn It Up** makes good use of the wrist and leg bands to allow players to concentrate on their Zumba skills.

Another type of movement game is **geocaching,** which is an outdoor activity where participants use a global positioning system (GPS) receiver or mobile device and other navigational techniques to hide and seek containers called 'geocaches' or 'caches' at specific locations marked by coordinates all over the world. A typical cache is a small waterproof container containing a logbook and sometimes a pen or pencil. The geocacher signs the log with their established code name and dates it to prove that they found the cache. After signing the log, the cache must be placed back exactly where the person found it. Most players also log their find and discover the coordinates for the caches via geocaching.com. As of 2023, over two million geocaches are officially registered on the website.

Aside from the benefits of physical activity associated with the treasure hunt aspect of geocaching, geocaching can also provide a useful context for learning for the wider curriculum. This includes learning about GPS technology, satellites, land access, basic navigation and the skills needed (including art and design skills) to design and hide your own cache. Using games in such a multi-disciplinary way is explored further in chapter 3.

The table below summarises the different categories of games mentioned above.

Movement game genre	Game title	Example of classroom implementation
Gamified fitness apps	★ Google Fit ★ Apple Fitness+ ★ Strava	Students set personalised health goals and track progress towards these goals using the fitness apps.
Video games designed to get you moving inside	★ Just Dance ★ Dance Central ★ Ring Fit Adventure ★ Switch Sports ★ Zumba Burn It Up	Students play the video game once a week as an alternative to that day's more traditional physical education class. Students track individual scores and progress in the video games and try to improve over a six-week period.
Video games designed to get you moving outside	★ Geocaching ★ Pokémon Go ★ Jurassic World Alive ★ Zombies Run	Students play the game for 30 minutes as part of a home learning task to help get them exercising outside. Back in class, they share their experiences and the virtual objects that they found with the rest of their class.

Video games that support the development of social and emotional skills

It is important to remember that modern video games offer more than purely escapist experiences. Video games can also provide a safe practice space to explore uncomfortable emotions with no actual consequences. Video games can provide an opportunity to give a range of choices to the player, which makes the consequences of their choices more powerful and meaningful.

Some narrative games make players face uncomfortable emotions, such as loss, grief, fear or despair. Media psychologists theorise that we engage with these forms of media (scary movies, games about sickness or dying) because these events are part of the human condition and they include issues we know we might all eventually face. These types of video games can be powerful for developing and improving social and emotional skills in young people.

Some examples of video games that can be used to support the development of social and emotional skills include **What Remains of Edith Finch**, where players explore and uncover the effects of intergenerational family trauma. Another example is **Lost Words: Beyond the Page,** where players experience two parallel stories: one mapped to stages of grief and bereavement and the other a hero's journey fighting dragons in the land of Estoria. There is a lot of research to suggest that as players work towards the resolution of a game, difficult emotions can start to subside. As a result, players can feel a sense of psychological growth and well-being.

Other games have been specifically designed to support young people in understanding illness. For example, **I, Hope** is the story of a young girl named Hope, whose town has been taken over by cancer. It supports children with cancer and brings positive and powerful elements into their lives. What is even more powerful about the game is that it was developed with input from children with cancer to make sure that the real 'lived experience' was taken into account during game development. Another example is **My Brother Rabbit,** which is a beautifully drawn adventure set in a surreal world that mixes reality with a child's imagination. A young girl faces a terrible reality when she falls ill. The little girl and her brother use the power of imagination to escape the hostile outside world where the adventure is cleverly mapped onto the brother making sense of his sister's illness and the different stages of the treatment processes.

Silver is a game created by the Flemish Centre of Expertise in Suicide Prevention, a partner organisation of the Flemish Government, to raise awareness of suicide among young people aged 15 to 19 years. It was created as a new approach to tackle the challenge of suicide being the leading cause of death in young people aged 15 to 19 in Flanders, Belgium. During the COVID-19 pandemic, video games like **Sea of Solitude** allowed players to normalise mental health conversations through an active form of storytelling.

Multiplayer games can also provide opportunities for social and emotional learning and collaboration, in particular. This might be about working with another child in **Minecraft** or **Roblox** to build something together. It could be playing **Animal Crossing** with someone who is new to the game and needs help. Or even just allowing other players to help you in a simulation game like **Farm Together.**

Some games also have game mechanics to encourage positive exchanges through social play. A good example of this is **Sky: Children of the Light**. Gameplay involves completing tasks as players explore a virtual environment. As they progress, they are rewarded with candles and hearts. Unlike many other games where the players themselves use collected rewards, in this game, a goal is to give gifts to other players, helping strangers along on their own journeys. Similarly, in **Kind Words (lo fi chill beats to write to)**, players send and receive notes of gratitude, kindness and encouragement through positive online exchanges.

Collaboration and social and emotional learning are also understood as important elements in esports (also known as video game competitions, or competitive video game play). Esports have grown a lot over the last few years and emerging esports research suggests that social and emotional skill-building can manifest in competitive team-based gaming (Kou & Gui, 2020). For example, players need to learn how to manage and self-regulate frustration and anger, both of which can lead to a deterioration of gameplay ability, and therefore are detrimental to success in esports.

Video games can also help us explore identity. This might include working out mental health scenarios in a game like **Psychonauts 2,** where you play the character of Raz, who has psychic abilities that let him delve into the minds of others.

It could be learning to help others with their fears and anxiety in **Rainbow Billy,** where it is the player's job to save the world from a colourless darkness. But unusually, players do this through listening

and conversation rather than traditional attacks. Or playing a game like **Celeste** that creates space to consider anxiety, self-doubt and self-regulation.

Games can also help us explore ethical dilemmas and the emotional reaction to these dilemmas. For example, in **Life Is Strange 2,** two brothers on the run need food to survive and must decide whether to shoplift from a supermarket. Because emotions manifest differently when players are in control; feelings of regret, shame, or guilt may be experienced and create powerful discussion points for social and emotional learning.

A summary of the key themes for some of the titles above are included in the table below.

Video game title	Video game provides a stimulus to discuss the following aspects of social and emotional learning
What Remains of Edith Finch	Loss; bereavement; intergenerational family trauma
Lost Words: Beyond the Page	Loss; bereavement;
I, Hope	Illness; terminal illness; treatment
My Brother Rabbit	Illness; treatment
Silver	Mental health; self-doubt; suicide
Sea of Solitude	Mental health
Celeste	Mental health; anxiety, self-doubt and self-regulation
Rainbow Billy	Fear; anxiety
Life is Strange 2	Ethical dilemmas
Esports	Self-regulation, collaboration, anger management

Key takeaways

- Choosing a game for learning requires numerous factors to be carefully considered.
- Video games can be used for learning numeracy, literacy and language skills.
- Video games can also be used for developing physical and movement skills.
- Video games can be a powerful medium to explore issues linked to social and emotional skill development.

Further resources and chapter references

Games in Schools MOOC videos:

- Literacy and Language Games,
- Numeracy and Cognitive Games,
- Movement and Physical Games,
- Social and Emotional Games,
- Further Resources and Inspiration.

Other resources:

- BrainPoP Game Finder,
- Family Gaming Database (UK),
- Foundation for Digital Games Culture (Germany),
- Putting Education in 'Educational' Apps: Lessons From the Science of Learning,
- Guide to Esports.

Games in Schools MOOC participant lesson plans:

- See Annex: Lesson plans

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Chapter 3:
Using video games for thematic project-based learning

'Now what we are talking about here is computer games not just as games, but as a whole new learning form or platform of learning and one that has quite literally unlimited learning potential.'
Lord David Puttnam

Introduction

In the previous chapter, we explored how video games have been specifically designed to support learning or, when combined with the right pedagogy, how they can be used to develop certain skills and knowledge. In this chapter, we will look at using video games in a more holistic and cross-curricular way by exploring how video games can be used to support thematic project-based learning.

What is thematic project-based learning?

Project-based learning is one of the pedagogies identified by Thomsen and Parker (2019) that closely align with the five characteristics of learning through play – meaningful, actively engaging, socially interactive, iterative and joyful – that we described in chapter 1.

Project-based learning often includes a lot of active learning activities that take place over a period of time. They are not isolated one-off classroom experiences. Projects might be based around a theme or a context for learning – this is thematic learning. Or they could be based around developing a product that requires interdisciplinary knowledge or skills. This can be described as product-based learning.

Thematic learning through projects involves choosing a specific topic to teach one or more concepts. The theme chosen is then demonstrated using a variety of information and resources. Thematic learning through projects is based on the idea that young people learn best through holistic, real-life experiences that they can relate to. For example, the selected project theme could be 'our oceans' and as part of this theme, there are opportunities to explore the curriculum through the lens of the theme of oceans. This might include:

- Learning about marine life including the differences between algae, fish, crustaceans and mammals or understanding why the ocean is salty **(science)**;
- Learning about the difference between lakes, seas and oceans or where the deepest oceans are on Earth **(geography)**;
- Learning why boats float, submarines sink and hovercrafts hover **(science, engineering and technology);**
- Improving literacy skills by reading a maritime-related text such as *Moby Dick* or *The Girl Who Rowed the Ocean* **(literacy).**

Thematic learning through projects has been found to have a real impact on children in terms of knowledge, skills and motivation. However, just like any pedagogy, it needs good facilitation and is reliant on several implementation factors to make it a success (Parker & Thomsen, 2019). Success is often contingent on the implementation context, including having the time and resources to administer, plan and manage classroom resources and teachers' time, knowledge, and skills to implement this approach.

Contextual hubs: Thematic project-based learning with video games

As previously mentioned, video games are highly culturally relevant for children and young people, and they provide a real-life experience that they can relate to. This means that a video game as a theme can provide a real 'hook' to capture the imagination of the children to both motivate and engage them in their learning.

This idea is supported by James Paul Gee, who has deconstructed what he believes to be the critical dimensions of video games, which make them powerful learning environments. One of Gee's central arguments is that video games create **'semiotic domains',** which are 'any set of practices that recruits one or more modalities (e.g. oral or written language, images, equations, symbols, sounds, gestures, graphs, artefacts, etc.) to communicate distinctive types of meanings' (Gee, 2004). The semiotic domain for a game is the world or culture it creates and is shared by those participating in the game together; in this world, participants share knowledge, skills, experiences and resources.

Active and successful participation in a semiotic domain is demonstrated by 'active learning', where group members gain the resources and skills to solve problems within, and perhaps beyond, the domain, and 'critical learning', which includes thinking about the game at a 'meta' level so that they cannot only operate within the game but also within the social structure that surrounds the game (Williamson, 2003).

Recurring gameplay is a key feature of successful thematic project-based learning with video games (Groff, Howells & Cranmer, 2010). This might include progressing in the game and getting immersed in the story or using the game to collect and re-purpose information such as high scores or other game metrics that the video game might produce through game play.

What types of games work best for thematic project-based learning?

The types of games that have been found to work well for thematic project-based learning are commercial-off-the-shelf (COTS) games that are built for entertainment. When combined with the right pedagogy, they can be used for education. These types of games also have the advantage that they have been created by large game studios and are often popular titles that reinforce cultural relevance and can really capture the imagination of children and young people.

Selecting the right game titles can be challenging. However, for educators who are new to this type of approach, it can be useful to select age-appropriate game titles that closely relate to a topic or theme that the teacher already feels comfortable with. For example, rhythm video games like **Guitar Hero, Rock Band, Pianista: The Legendary Virtuoso;** DJ video Games like **Hexagroove** or **Fuser** or dance video games such as **Just Dance** or **Dance Central** all have strong connections to music and performance. Some educators already use music for thematic or topic-based work. Therefore, the leap from using a context like music in general to a context of a video game that revolves around music might seem less daunting. It primarily depends on teacher confidence to use the video game rather than designing tasks that link to the theme of music.

For young people, the thought of doing work around a video game rather than a traditional 'music' context is often highly motivating. If you can select the right video games, you can end up with an amazing environment for learning where the domain of the interests of young people (the video game) crosses the domain expertise of the teacher (the pedagogy).

Examples of video games and thematic project-based learning

The following five case studies provide examples of how different genres of video games can link to thematic project-based learning.

Case study 1:
Rhythm, DJ and dance video games

Possible video games:

- Guitar Hero
- Rock Band
- Pianista: The Legendary Virtuoso
- Hexagroove
- Fuser
- Just Dance
- Dance Central

Possible learning activities/sub-themes to explore:

- Different musical instruments
- Genres of music
- How music makes you feel
- Traditional music from around the world
- How music has changed over time
- Diversity of the music industry
- Make your own music, set or dance routine
- Video game character representation and character studies
- Marketing (e.g. logos, branding, merchandise)
- Organise a world tour (inc. venue, schedule, eco-footprint, etc.)

Detailed example: Just Dance thematic project

As part of a Just Dance thematic project, young people are divided into 'dance teams' (groups) for project-based work. They use

the Just Dance video game each day for 30 minutes to practise the dance routines within the game **(physical education)** and to progress through the game. As they progress through the game, they collect data, such as high-scores and accuracy scores, which is used by the teacher to support daily numeracy lessons **(mathematics)**. Each member of the class picks a character from Just Dance and carries out an individual character study on the video game character **(literacy).** They also design their own video game characters choosing their gender, age, fashion, preferred genre of dance music and how this might all influence the fictitious characters' behaviours if they existed in real life **(literacy)**. As part of an extended project, they explore how dance has evolved through the ages **(history)** and share their findings by making a digital video **(ICT)**. For the project finale, they design and choreograph their own dances **(physical education)** to electronic music that they have composed themselves **(music and ICT)**. They imagine that they are taking their act on a world tour and use the internet to plan their tour including searching countries and venues **(geography)** and calculating their carbon-footprint **(science)**. They perform their dance routines to their parents and the school community as part of a Just Dance celebration.

Case study 2: **Sports games**

Possible video games:

- Mario and Sonic at the Olympic Games
- FIFA
- Lonely Mountains Downhill
- Out of the Park Baseball
- Art of Rally
- National Hockey League (NHL)

Possible learning activities/sub-themes to explore:

- The history of the sport/event
- Connection between sport and culture
- Health and wellbeing
- Diversity and stereotypes
- Competition vs collaboration
- Science of equipment and physiology
- Venues
- Geography of host countries
- Data (inc. league tables, high scores, distances, fastest times, etc.)

Detailed example: Mario and Sonic at the Olympic Games project

As part of a Mario and Sonic at the Olympic Games project, a school engages in thematic project-based learning about the Olympics using the Mario and Sonic game as the context for learning. There are three classes in the school who are all doing project work linked to Mario and Sonic, and for the purposes of the project, the classes are renamed as three Olympic Countries – Japan, Norway and Brazil. One of the first activities the class does is research the country that they will represent **(geography).** Each country uses the game after morning break each day for 30 minutes to improve their gameplay skills in a variety of digital Olympic sports. They focus on two mini games a week over a 6-week period. Data from the mini games (times, distances, heights, high-scores, top speeds) is used by the teacher to support daily numeracy lessons **(mathematics)**. The class watches the other teams in the class as they compete in the mini games and they use what they see to develop skills in factual writing linked to sports journalism **(literacy)**. Other literacy work linked to the project includes character studies and writing fictitious biographies of Olympic and Paralympic athletes. As part of this work, they learn about stereotypes and how to challenge stereotypes. The class also learn about health, nutrition and training programmes used by Olympic athletes as they train for the games. They also organise and take part in intra-class mini-Olympic games on their school grounds **(health and wellbeing)**. As part of a group project, the class researches the history of the Olympics and the ancient Olympic games **(literacy and history)**. For more details, take a look at the Games in Schools MOOC video about Mario and Sonic at the Olympic Games.

Case study 3:
Film franchise games

Possible video games:

- LEGO Star Wars
- LEGO Jurassic World
- LEGO The Incredibles
- Marvel's Spider-Man: Miles Morales
- WALL-E
- Cars: Driven to Win

Possible learning activities/sub-themes to explore:

- Documenting characters in the video game
- Diversity of the video game and its characters
- Studying the themes of the video game (e.g. space, dinosaurs, robotics, combustion, etc.)
- Exploring game environments and how they link to the real world (e.g. tundra, hot deserts, volcanoes, etc.)
- Data (inc. high scores, gold coins, completion times, etc.)
- STEM (inc. coding)

Detailed example: LEGO Star Wars project

As part of a LEGO Star Wars project, the class plays LEGO Star Wars for 30 minutes after lunch every day to progress through the game. As they play the game, they keep a live inventory of the characters they meet and unlock, the starships they see and fly, and the planets they visit. They continuously use this live data to look at data sorting, data organisation and data visualisation, for example, droids vs humanoids vs other alien characters **(numeracy)**. As the class discovers characters from the Skywalker family, they are mapped on a family tree **(history and numeracy)** and the teacher also uses the Skywalker family as a context to talk about loss, family separation and adoption **(personal and social education)**. As the class discovers characters that are not in the films (e.g. the droid R2-KT) or adaptations of characters for the game (e.g. summer vacation Obi-Wan), they are encouraged to use game notes about the character as a stimulus to develop fictitious writing by developing a more complex backstory for the new characters **(literacy).** Star Wars also gives an opportunity to learn about space, and as part of the project, the class completes a study into our own solar system and galaxy **(science)**. As LEGO Star Wars is full of droids and other robots, the teacher takes the opportunity to teach the class about robotics and automation, including using code.org to develop some basic coding skills using the Star Wars challenges on the code.org website **(computer science)**. Finally, as the class discovers and explores new planets, they complete parallel work to learn about these different landscapes by comparing Star Wars planets to places on Earth (e.g. Endor as a context to teach about the rainforest and Hoth to teach about arctic tundra) **(geography)**. For more details, take a look at the Games in Schools MOOC video about thematic learning with Star Wars.

Case study 4:
Underwater games

Possible video games:

- Beyond Blue
- Abzu
- Depth Hunter: Deep Dive
- Song of the Deep
- Subnautica
- Koral

Possible learning activities/sub-themes to explore:

- Seas and oceans
- Marine life and ecosystems
- Rising sea levels and climate change
- Overfishing
- Marine and water pollution
- Maps and ocean charts
- Diversity of the marine industry and representation in the video game
- Nautical equipment (e.g. boats, anchors, submarines, etc.)
- Nautical science (e.g. buoyancy, pressure, tides, ocean currents, etc.)

Detailed example: Beyond Blue project

As part of a thematic project using the game Beyond Blue, the class plays the game in small groups throughout the day for a period of time (e.g. one group at the start of the day, one group after break and one group after lunch). The teacher finds that by spreading game play out throughout the day, it has a soothing effect in the class environment and helps settle the class after periods of excitement (e.g. break time). The teacher discusses why this might be and how this might be linked to mental health **(personal and social education)**. The class also has the game on in the background during the day in case anything 'floats' by. As the class discovers new species, students record what they have found and take scientific measurements such as length, weight and species **(maths and science)**. Each week, individual members of the class pick one of the species they have discovered and research it in more depth **(literacy).** They then present their findings back to a small group using presentation software **(ICT)**. This is linked to an extended project on the oceans in which the class maps the seas and oceans and also learns more about ocean currents and how they have an impact on marine life and our climate **(geography).** A big part of the project is about exploration, and this helps the teacher introduce the class to the concepts of latitude and longitude **(geography)**, tides, buoyage, the design of boats and submarines, and deep-sea diving equipment **(science)**. The class also visits their local beach to look for signs of local pollution before returning to class to carry out an investigation into ocean pollution and in particular the impact of plastic in our seas and oceans and how this impacts the ocean ecosystem **(geography and science).**

Case study 5: Environmental games

Possible video games:

- SimCity
- Alba: A Wildlife Adventure
- Endling: Extinction is Forever
- Eco
- Keep Cool
- Anno 1800
- Sonic the Hedgehog[1]

Possible learning activities/sub-themes to explore:

- Climate change and global warming
- Settlement and population growth
- Deforestation
- Conservation
- Recycling
- Protecting and destroying ecosystems
- Extinction
- Decision making
- Environmental investment (short term vs long term)
- National parks and environmental law
- Careers linked to environmental protection and conservation

1 Although most players may not know, the *Sonic the Hedgehog* series has always had environmental messages at its core. In almost every game, Sonic and his other animal-inspired friends are fighting against Dr Robotnik and his robots, which shows the conflict between nature and the destructive force of modern technologies. During a 2010 interview with the franchise's creator, Yuji Naka, he even confirmed these themes, saying that Dr Robotnik is meant to be a 'radical representation of all humanity and the impact humanity is having on nature'. Since Naka couldn't speak out about his environmental opinions in 1991, he instead used video games to convey how modern technology and pollution harms nature.

Detailed example: SimCity project

As part of a project using SimCity, the class works in groups of five to build and develop their virtual cities over 6 weeks. They take it in turns to play (one player per day over a week), but must make decisions about where they will invest as a group. The teacher finds that this improves their communication and group-work skills **(literacy and civics)**. Along the way, they have to expand their city and the teacher uses this as a context to teach about urban sprawl, deforestation and natural disasters such as landslides **(geography).** As their settlements become more industrialised, they learn about pollution caused by factories **(history and science)** and the importance of balancing economic growth with environmental sustainability **(geography, mathematics and science)**. As the population grows, they learn about tax, taxation and investments **(mathematics and financial education)**. Towards the end of the 6-week period, when you can visually see the impact of settlement and industrial growth within the game, the class learns about climate change **(science)** and how ecosystems can be protected **(geography)**.

Open-ended video games for thematic project-based learning

Open-ended video games (often referred to as 'sandbox games') are video games that often have no or very few pre-determined limitations with no fixed answer or final goal. Open-ended games can make great contexts for thematic project-based learning because they offer the opportunity for a wider variety of tasks and flexible learning constructed around them.

Popular examples include:

★ **Minecraft**: an excellent open-ended game where players can build whatever they like and explore worlds that other players have created. The flexibility and immersive nature of Minecraft provides a great context to learn about history, geography and science and is a great environment to get young people engaging in the creative process, from building new things to providing a stimulus for creative writing and poetry. A good example of this is the five Frozen Planet 2 Minecraft worlds and associated educational materials, where players can experience life through the eyes of the animals who live in these amazing environments. This provides a great context for thematic project-based learning linked to oceans and/or the environment.

★ **Roblox**: a game platform and game creation system that can be used in a similar way to Minecraft, as it allows users to programme experiences and play games that are created by others, some of which are aligned to educational curricula. One example of a game that has been created is 'Mission Mars', where players can explore the rough and rugged red planet, go on missions and help determine the future of humanity on Mars. The game is based on science and is powered by data from NASA. This provides a great context for thematic project-based learning linked to space and/or STEM.

★ **Journey**: an adventure game set in a desert. By exploring the eerie sandscape, players discover a world that has been abandoned by the race that created it. The sense of space and scale evokes feelings of loneliness and being lost. Then the game pairs players with other players, one at a time, who appear on the distant horizon. Interestingly, while the journey through the landscape inspires awe with a feeling of loneliness, the presence of another anonymous person creates surprising comfort. Video games like Journey provide a great context for creative writing.

Video games based on historical events

Video games based on historical events also make good contexts for thematic project-based learning. These include historical games such as **Valiant Hearts,** which is designed to assist players to remember and learn about World War I. Rather than being a war game or a first-person shooter game, it focuses instead on depicting the trials and tribulations of soldiers on both sides during the war. To ensure the game was historically accurate, the team listened to first-hand accounts of the war, read letters written by enlisted soldiers and travelled to the remains of wartime trenches in France.

Other video games that are designed to teach about war include **This War of Mine**. The game differs from most war-themed video games and focuses on the civilian experience of war rather than front-line combat. Characters must make many difficult decisions to survive everyday dangers. This game has also been accepted as part of the Polish national curriculum.

The Institute of National Remembrance in Poland has produced **Cyphers Game,** which describes the course of the Polish-Bolshevik war and the contribution of Polish cryptology to its victorious end. The game features have been accurately reproduced from historical exhibits and the players' missions reflect historical events.

The Assassin's Creed game series also offers a variety of historical settings that can be used by teachers for thematic project-based learning, as they include an educational mode called Discovery Tour. This allows the player to explore the setting without any combat or quests. This means students can explore Ancient Greece, for example, by visiting historical sites and even getting guided tours within the game.

Finally, tactical and strategy games like **Age of Empires**, **Civilization**, **Northgard** and **Dawn of Man** can easily be linked to the curriculum and become a context for thematic project-based work in social science subjects.

Key takeaways

★ Project-based learning closely aligns with the characteristics of learning through play.

★ Video games can act as contextual hubs thereby providing a real 'hook' to capture the imagination of students to both motivate and engage them in their learning.

★ Commercial-off-the-shelf (COTS) games that are built for entertainment are best for thematic project-based learning.

★ Teachers should start out with games that closely relate to a theme or topic they are already very familiar with.

★ Open-ended video games lend themselves well to thematic project-based learning.

Further resources and chapter references

Games in Schools MOOC videos:

★ Using Games for Thematic and Project-Based Learning,

★ Mario and Sonic at the Olympic Games,

★ Thematic learning with Star Wars,

★ Further resources and examples.

Games in Schools MOOC participant lesson plans:

★ See Annex: Lesson plans

Other resources:

★ Mario and Sonic at the 2024 Olympic Games.

Star Wars-related resources:

★ The Skywalker Saga,

★ Endor from Return of the Jedi (to teach about rainforests),

★ Tatooine as featured in the Phantom Menace, A New Hope and Return of the Jedi (to teach about hot deserts),

★ Planet of Mustafar from Revenge of the Synth (to teach about volcanoes and volcanic landscapes),

★ Hoth from The Empire Strikes Back (to teach about the Arctic Tundra).

Websites related to coding:

★ Code.org,

★ Sphero.

Applications for teaching about space and the galaxy:

★ Worldwide Telescope,

★ Google Sky.

Games with a strong link to the climate:

★ Eco,

★ Keep Cool.

Games that teach issues linked to climate and environmental impacts:

★ Anno 1800,

★ UNEP Choice award for Green Game Jam 2021.

Chapter references:

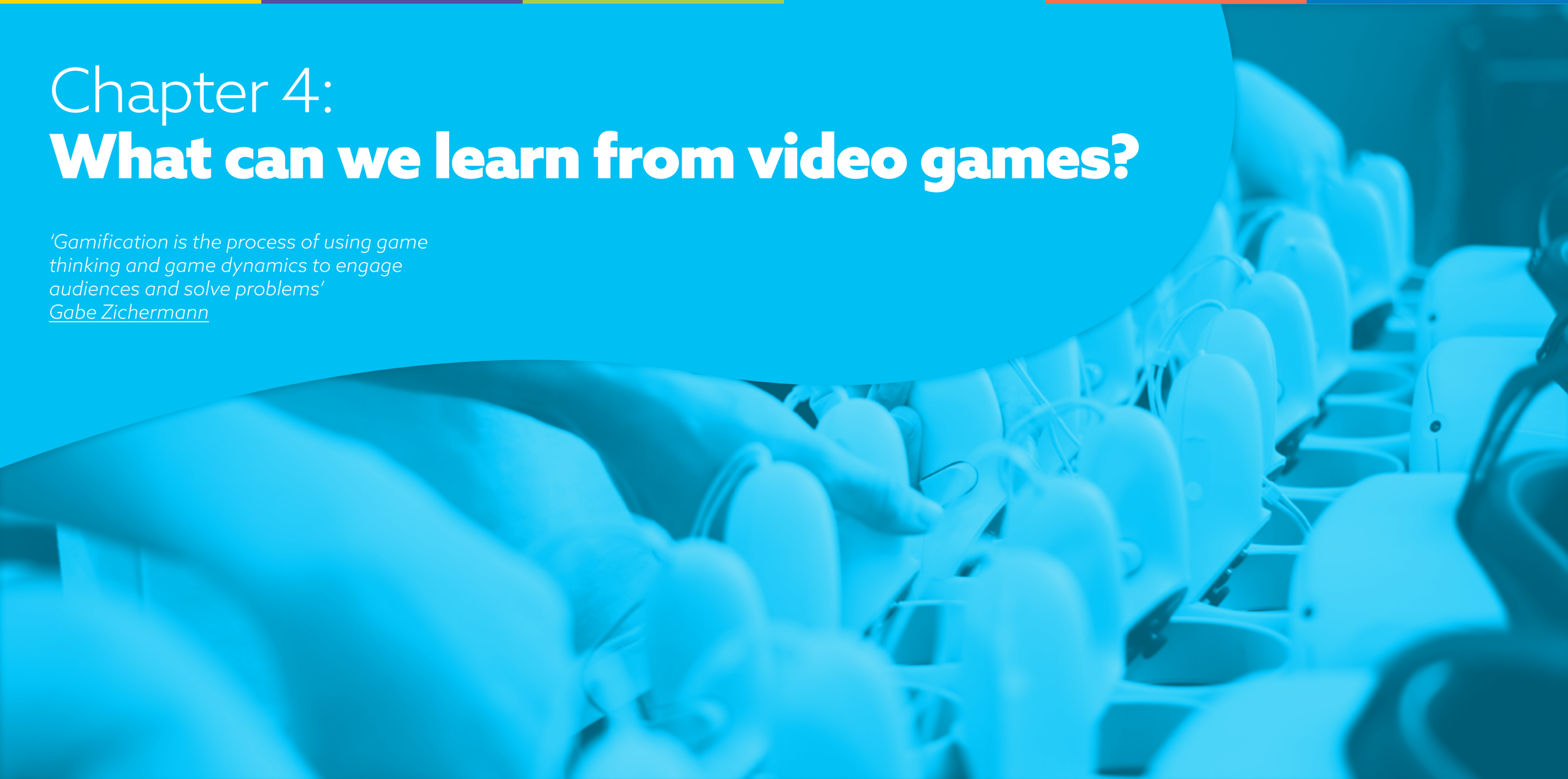
Gee, J.P. (2004). What Video Games Have to Teach Us About Learning and Literacy. St. Martin's Griffin.

Groff, J., Howells, C., & Cranmer, S. (2010). The impact of console games in the classroom: Evidence from schools in Scotland. *UK: Futurelab.*

Parker, R., & Thomsen, B.S. (2019). Learning through play at school. A study of playful integrated pedagogies that foster children's holistic skills development in the primary school classroom. The LEGO Foundation. Denmark. https://cms.learningthroughplay.com/media/nihnouvc/learning-through-play-school.pdf

Chapter 4:
What can we learn from video games?

'Gamification is the process of using game thinking and game dynamics to engage audiences and solve problems'
Gabe Zichermann



Introduction

In this chapter, we will explore how some of the design principles used in games can be built into how we work with children and young people at school.

We will discuss the concept of gamification and what it might mean to gamify our classrooms to create more engaging and motivating learning environments. This will include a deeper dive into some of the tools and behaviours often associated with gamification, such as issuing digital badges or digital rewards.

What is gamification?

Gamification is about taking something that is not a game and applying game mechanics in a strategic attempt to enhance systems, services, organisations and activities by creating similar experiences to those experienced when playing games to motivate and engage users.

Gamification through digital technology is actually very common in our everyday lives. Examples of gamification include:

★ Many consumer apps provide rewards for loyalty and allow you to accumulate points that lead to rewards. This is similar to the experience points gained in many video games and the rewards obtained when designated levels are reached.

★ Most fitness apps are heavily gamified to encourage you to play, practise and improve. They also use experience points and leader boards like in video games.

★ As we discussed in chapter 2, learning apps – such as Duolingo – are often gamified to help motivate you and engage with learning in different ways. For example, they use self-directed competition (beating your own high score) and levels to motivate users and keep them engaged.

★ Some cars give you an eco-score or eco-light to help you drive more efficiently. This also uses game dynamics in the form of high scores and self-directed competition.

The concept of gamifying classrooms is not new. It first gained public attention in 2010 when Professor Lee Sheldon from Indiana University announced that he was doing away with grades and instead awarding students with experience points. In short, what Sheldon was doing was rewarding students for ongoing effort, rather than the final outcome.

Five tips to help gamify your classroom

There are many ways to gamify a classroom depending on the topic, the age and stage of the students, and your education system. The below tips serve as a starting point to get you thinking. Please note that these tips are simply designed to give you some ideas to explore.

Tip 1: Gamification tools

Gamification tools allow you to create a virtual classroom that uses game mechanics, where you can reward actions with things like digital badges or experience points. Students can also come together in groups and go on quests to complete learning tasks.

While you do not need gamification tools to gamify your classroom, it does provide a nice way to bind the learning experience together.

Examples of gamification software include **Classcraft** and **ClassDojo**.

Tip 2: Language, choice and collaboration

Changing the **language** in the classroom can make a difference to motivation and the overall experience. For example, units of work become quests or expeditions and groups become clans or guilds. Of course, this all needs to be linked meaningfully to the learning objectives.

Video games are often full of **choice** and opportunities for collaboration. Teachers should think about their units of work and consider how they could build in more choice, for example, different types of assessment.

Video games are often highly collaborative. Teachers should think about how they can integrate more **collaboration** into their lessons. For example, working in groups with other schools or experts (via

video conference) to help children and young people be more engaged in their learning.

Tip 3:
Experience points

Experience points are rewarded as learners progress through a task or topic and not just at the end of a task or topic. As well as awarding experience points, you also need to track and recognise the points that are achieved by individual members of the class and their respective groups. You can do this using the gamification tools mentioned above. You can also track points in an Excel file or Google Sheet.

For experience points to work with a class, you need to make sure that you recognise when points have been awarded and accumulated. One way to do this is through **leader boards.** You also need to consider what happens after you have accumulated a certain number of points. For example, a certificate, a phone call home and digital badge.

Don't forget that a leader board used in the wrong way can have a very negative impact on individual and class motivation. No one wants to be at the bottom of the leader board all of the time. So you need to think of different ways to get around this. For example, leader boards for different things such as collaboration, helpfulness and creativity. You can also have peer-assessed leader boards.

Tip 4:
Redefining failure

In a traditional classroom setting, if you fail at something, this is often seen as a negative. But in a video game, if you fail, it is normally seen as an opportunity for further practice.

In our gamified classrooms, it is important to redefine classroom ethos and emphasise that practice is important and failure is not a bad thing. Furthermore, that it is important to keep practising so that we can get better and achieve the final outcome.

Tip 5:
Recognise achievement and mastery through digital badges

Digital badges provide a digital visual representation that is awarded when a learner completes a task or achieves a skill or achievement. Digital badges are popular on learning apps like **Duolingo** (see chapter 2) and learning platforms like **Khan Academy** as part of their gamification strategy.

Digital badges come in all shapes and sizes. The simplest form of a digital badge is one that an adult or teacher creates themselves. This is often just a .jpeg or other image file that is awarded to the students for them to put on their profile.

More sophisticated digital badges such as Open Badges also contain some kind of metadata behind the badge. This means that somebody can click on the badge to see who has issued the badge and what the credentials are for earning the badge in the first place. You can find out more about Open Badges on openbadges.org.

Gamification and motivation

It is worth noting that gamification techniques, such as the ones listed above, quite often rely on extrinsic motivation, where students are often more engaged in the game mechanics rather than the topic itself. If your goal is to train someone to perform a specific task at a specific time, then gamification can be an effective strategy. Turn the task into a game, offering points or other incentives as a reward, and people are likely to learn the task more quickly and efficiently.

However, if your goal is to help people develop as creative thinkers and lifelong learners, then different strategies are needed. Rather than offering extrinsic rewards, it is better to draw upon people's intrinsic motivation, i.e. their desire to work on problems and projects that they find interesting and satisfying.

Of course, good lesson and curriculum design gives an opportunity to hook students though extrinsic motivation and then adjust the pedagogy by giving students more agency to engage intrinsically in the topic and through this, deepen the learning experience.

Key takeaways

★ Gamification is about taking something that is not a game and applying game mechanics in a strategic attempt to enhance systems, services, organisations and activities by creating similar experiences to those when playing games to motivate and engage users.

★ Gamification measures can be introduced in the classroom through simple methods such as changing the language used in the classroom to more comprehensive approaches that involve the use of gamification tools.

★ Gamification relies on extrinsic motivation and should therefore be used with caution and only to support work on specific tasks at specific times. Gamification should not be used to develop more holistic skills.

Further resources

Games in Schools MOOC video:

★ Gamification & Digital Badges.

Other Resources:

★ Gamification of classrooms by Professor Lee Sheldon (2010),

★ Classcraft.com: to create a virtual classroom that uses game mechanics,

★ Classdojo.com: to reward experience and effort through experience points as learners progress through a task or a topic,

★ Khan Academy: using digital badges as part of their gamification strategy,

★ Open Badges,

★ Global Learning Consortium,

★ How teachers can use video games to motivate students.

Chapter 5:
Designing and making video games

'Children need to be given digital building blocks to inspire them to build digital content.'
Ian Livingstone

Introduction

In this chapter, we will explore why teaching and learning about video game design is important in schools. This will include a brief introduction to the game design industry and an introduction to a variety of tools that can be used to teach video game design to young people at different ages and stages.

An important premise of this section is that if we are serious about building a more creative society, we have to encourage young people to create and build things. This includes physical and digital artefacts, such as video games.

Why is video game design important?

The importance of video game design in schools and education systems comes down to three main things.

The first concerns the development of holistic or soft skills. Learning how to design and create video games allows young people to express themselves creatively and develop their problem-solving skills. Video game design requires young people to think outside the box and come up with unique and innovative ideas for their games. It also requires them to solve problems and troubleshoot any technical issues that may arise during the development process. These skills can help children develop their creative thinking and problem-solving abilities, which are essential in many areas of life.

The second is that designing video games can also help young people develop technical skills, such as programming and coding, and storytelling, illustration and graphic design. Teaching children video game design can introduce them to the fundamentals of computer programming. This can help them develop an understanding of how computers work and give them a foundation in coding, which can be useful in a wide range of careers.

The third reason is economic. The video game industry is huge (see below) and while we know that the industry is thriving in many parts of Europe, there is lots of evidence to suggest that companies and countries cannot get enough game designers and coders and people with the digital skills to support the video game and wider technology industry. Playing video games and video game design can be a great way to get young people interested and engaged in STEM activities and careers. This is also the case for groups of people who are traditionally underrepresented in the industry, such as females or minority groups.

Inclusivity in the video game design industry

As mentioned in chapter 1, there are over three billion video game players around the world, and globally, the industry is worth a staggering $180bn, more than double the film industry. Across Europe, 47 % of video game players are female, and women represent 53 % of all mobile and tablet game players. In contrast, according to the International Game Developers Association (IGDA), 71 % of game developers globally are men, while just 24 % are women (22 % in Europe) and 3 % are non-binary, even though 45 % of players globally identify as female (47 % in Europe). Even more strikingly, when it comes to race and ethnicity, just 2 % of developers are Black, while 69 % are white. This lack of representation of females and minority groups is also critically reflected in the characters on screen. Nearly 80 % of lead characters in games are male, 54 % of lead characters in games are white and only 8 % of main characters in games are non-white females.

While these statistics may appear both surprising and disappointing, it is important to note that the video game industry has made huge steps forward in recent years to recognise diversity and be more inclusive. For example, there have been several national initiatives such as Women in Games (France), Diversi (Sweden) and #PlayEquALL (Spain) that have been designed to encourage females into the video game industry. In 2022, Women in Games, supported by Video Games Europe, developed a guide titled, 'Building a Fair Playing Field', which outlines the challenges related to gender inequality facing the video game industry and presenting best practices from video game companies towards inclusion and gender equality. These efforts have led to more inclusive approaches being used in many modern games. For example, more games allow players to customise their character and more blockbuster games have lead female characters that are deep, complex characters who are not sexualised.

These initiatives, and teachers using video games in the classroom and focusing on video game design, are critical in encouraging

young girls and minority groups to see and believe that they have a place within the video games industry.

Video game design and interdisciplinary learning

Video game design also gives us an incredible way to work in a cross-curricular or interdisciplinary way. In fact, game design can be used as a context for thematic project-based learning in the way we discussed in chapter 3.

For example, video game design gives us an opportunity to develop video game storylines and plots and developing characters, character back stories and character depth **(literacy).** Characters and sets also need to be visually designed and story boarded **(art and design)** and some of the best games have in-game music and sound effects **(music).** Characters and objects in the game need to be able to react to each other and the game environment around them and this often involves the use of physics engines **(science)**. A wide set of STEM skills can also be developed to ensure that characters come alive, interact and react within the game using code and visual scripting and, increasingly, the use of artificial intelligence to programme interactions with non-player characters **(computer science).** Video games also need to be played, de-bugged and modified **(computer science)**. If we want a game to be successful, it needs to be marketed, advertised and packaged **(business studies)**. All of this provides a great way to link subject disciplines together in a way that requires young people to work together to achieve a common goal. This also encourages young people to be creators and not just passive consumers of digital content.

Designing video games can also be used to demonstrate learning at the end of a unit of work or as part of an assignment or final assessment. For example, *'Create a game that shows some of the problems caused by climate change and what some potential short and long-term solutions might be.'*

Video game design progression

For video game design to be embedded in schools, it should be done in a progressive way and not just as an activity that young people engage in when they get to a certain age or stage, or as a reward.

This progressive set of experiences and skills should be developed from an early age to the point where young people have a choice to specialise in video game design or in other studies that are more important to them. We often think of this as a progression framework from age 5 to age 18.

Progression frameworks should not just include a progression in technical skills from 5–18 years, but also progression in terms of soft skills such as creativity and problem solving and progression in interdisciplinary skills such as storytelling, character development and marketing.

Below, we will discuss a range of progressive tools that can help young people develop their skills in game design.

Simple game design tools

There are a number of simple game creation tools that can be used to help young children design video games and help them develop the key skills associated with video game design, such as storytelling, level development and character interactions. In a classroom setting, playing other people's creations and offering feedback to others in the class is useful for user or consumer feedback and an important part of the game design process. It also helps young people learn how to deliver and receive feedback in an appropriate way.

One of the simplest tools to get very young children designing and developing a range of early game design skills is **Toca Builders,** which is a sandbox-style building app in the vein of Minecraft, but designed for younger children who might not be quite ready for Minecraft yet. Toca Builders is a construction game where you can design single levels based around a theme of your choosing before re-playing the level or getting others to play it. Game design involves the player controlling six variables in the form of 'builders', each of whom has a different job, to design whatever types of level the children can imagine. For example, one builder controls the colours of the level, while others control the terrain by dropping or destroying blocks.

Another great game design tool to help young people develop skills in level development and storytelling for platform games is **Super Mario Maker 2** for the Nintendo Switch. The game is a

'do it yourself' program, where players are given a large range of tools and themes to create their own Super Mario levels. There are different types of terrains, blocks, power ups and enemies that can be placed anywhere players want. It all works on a grid system and players place the item that they want onto the map until they have created the level in line with their plan or imagination. Once complete, players can upload their game and play hundreds of games that other people have created.

To help develop basic coding skills with young people and to give them more agency to design their own characters and backgrounds, **Scratch Junior** provides useful tools that introduces block-based coding and computational thinking. In Scratch Junior, children create code in objects called sprites, which can be characters or other objects. Scratch Junior comes with a library of sprites, and sprites can be edited or new ones can be created using the Paint Editor. Code is created by dragging blocks into a coding area and snapping them together. All the blocks are completely icon-based (no text), which is how children can use this tool even before they can read. Blocks are connected from left to right, like words. There are lots of resources available online, including a curriculum, lesson plans and a really useful set of coding cards to support the use of Scratch Junior in the classroom and you can find them all for free on the Scratch Junior website.

All of the above tools also work well to get young people to respond to challenge prompts, for example, 'Create a game where Mario has to collect 50 gold coins, but is only allowed to jump three times' or 'Create a game in Scratch Junior that teaches others about recycling'.

Intermediate game design tools

Scratch is a more advanced version of Scratch Junior. Scratch is the world's largest coding community for children and is a coding language with a simple, block-based visual interface that allows young people to create digital stories, games and animations. Scratch originated from the MIT Media Lab and is now designed, developed and moderated by the Scratch Foundation, a non-profit organisation. The Scratch website provides links to projects and ideas to get you started using Scratch and a useful set of coding cards that can be used with classes for self-directed learning.

Roblox, as previously mentioned in chapter 3, is an online game platform and game creation system that allows users to program games and play games created by other users. Roblox Studio allows young people to design virtual environments and experiences or learn computer science with Lua, a text-based coding language similar to Python, as they create their own 3D world. Roblox has a wide variety of free lesson plans and resources for students and teachers to support both playing or designing experiences. The Roblox lesson plans are flexible and customisable with many options for different ages, subjects or time periods, such as a 45-minute workshop or a lesson.

The **Minecraft** education website is a great place to explore the potential of Minecraft for learning and game design. From the website, you can browse over 600 curriculum-aligned lessons to engage students in learning. Some of these lessons are particularly aligned to game design, including the computer science progression framework, which is designed to empower students to code with purpose in preparation for future jobs and real-world problem solving. There is a wide variety of free professional learning tools for teachers available on the website. The website also usefully includes links to a wide variety of research and articles showing the evidence of the impact of Minecraft being used in the classroom.

Advanced game design tools

RPG Maker is a role-playing game (RPG) maker. Games made in RPG Maker are map-based, which means that players explore the story via the map. Role-playing games are narrative driven, which means there is a lot of potential for young people to develop their own stories and characters. Being able to write and storyboard a multi-directional storyline is key for a successful RPG.

The **Unreal Engine** from Epic Games is an industry standard game design software and one of the world's most advanced real-time 3D creation tools for photoreal visuals and immersive experiences. It contains a number of advanced tools and features, including visual scripting, lighting controls, effects engine and physics engine. The Unreal Engine has an active developer community and a wide range of free tutorials and professional learning opportunities available on their website. These training materials include modules in Real Virtual Beauty, which is an initiative supported by Dove, the Centre for Appearance Research, and Unreal Engine Education. The Real Virtual Beauty course teaches users how to create more diverse and authentic characters for games. By bringing variety to the appearance and functionality of characters – particularly female characters – it allows users to be part of a bigger movement to improve the well-being of players by raising their self-esteem,

elevating their idea of how they fit in the world and broadening representation.

Unity is a cross-platform game engine developed by Unity Technologies. It is particularly popular for iOS and Android mobile game development and is considered easy to use for beginner developers despite its sophisticated-looking outputs. It is also good for developing video games for both virtual and augmented reality. Like the Unreal Engine, there are a wide range of online professional learning opportunities available and a supportive online community to get you started and to help you create industry-standard games. You can find the Unity learning pathways on their learning platform. The learning platform is also gamified, so you can earn experience points and digital badges.

It is important to note that both the Unreal Engine and Unity are free to use in schools, although they operate a royalty model, so if you ended up commercialising a game, you would have to give Epic or Unity Technologies a percentage of the profits. This is a great opportunity to teach students about revenue sharing and other aspects of financial literacy. One of the challenges with both the Unreal Engine and Unity is that because they are industry-standard tools, they require a high-spec computer with an advanced graphics card for them to work properly.

Game design communities

An often-overlooked aspect of using game design in the classroom is the opportunities it offers for facilitating collaboration and international exchange. For example, there are very active communities based around a number of the game design tools that we have mentioned above, including Scratch, Roblox, Minecraft, RPG Gamemaker, the Unreal Engine and Unity. **Gamestar Mechanic** is another example of an online community designed to teach the guiding principles of video game design and systems thinking. These communities can be used by students to interact and collaborate with peers from across the world. They can also be used as a basis to teach online safety and digital citizenship.

Key takeaways

- Video game design can be used as a contextual hub for learning.
- Using video game design in schools is a powerful method to develop a whole range of holistic and technical skills.
- Using video game design in schools is important to improve inclusivity in the game design industry.
- There are many different game design tools that are suitable for a variety of ages and experiences.
- Video game design should be embedded in schools in a progressive way.
- Communities focusing on game design offer a great learning opportunity.

Further resources

Games in Schools MOOC videos:

- Simple Game Design Tools,
- Game Design for Younger Children,
- Advanced Game Design Tools,
- Further Resources and Stimulus.

Other resources:

- Women in the gaming industry
- Free tutorials and professional learning available via unrealengine.com/learn,
- Real Virtual Beauty: initiative supported by Dove, the Centre for Appearance Research and Unreal Engine Education,
- Unity learning pathways,
- Learning guide about Gamestar Mechanic.
- Software to help simulate character and set design:
- Milanote – to easily organise ideas and projects into visual boards,
- Perchance.org – to create images from a text prompt,
- Blockade Labs – to create 3D backdrops.

Chapter 6:
Why is it important to teach about video games?

'It's one thing to build the sandbox for children. It's another to jump in and play with them.'
Vince Gowmon

Introduction

It is important to teach about video games for a number of reasons.

Firstly, as already discussed in previous chapters, across five key European markets (France, Germany, Italy, Spain and the UK), 50 % of the population aged between 6 and 64 play video games. However, if you break these statistics down further, they show that 68 % of 6 to 10-year-olds, 79% of 11 to 14-year-olds and 72 % of 15 to 24-year-olds play video games. This provides further evidence that video games are highly popular and culturally relevant to children and young people.

Secondly, because so many young people play video games, it is important to have dialogue with children and young people to ensure that they are emotionally confident with the content that they encounter.

Thirdly, video games and the technology that we play video games on has changed considerably over the last 40 years. Games consoles, PCs and mobile devices are not only gaming platforms, but they also provide access to a variety of other features such as social networks, internet and in-game messaging, online communities, payment systems and web browsing. It is therefore important to consider online safety and responsible use of these technologies in the context of video games.

In this chapter of the Games in Schools Handbook, we will explore some of the key areas for teaching video games to children, young people and their parents.

The evolution of games

You only have to look at the advances and evolution of video game characters to appreciate how much games have evolved over time. For example, Mario today looks and feels completely different from the 'original' Mario who appeared with the first Nintendo Entertainment System in 1985. In fact, human video game characters are now photorealistic on some platforms.

Interactions within games are also starting to get more realistic. Advanced peripherals and advances in virtual reality help link the physical and virtual world. Haptic technologies like gamer vests and gloves allow players to feel immersed in a game. Other game peripherals use haptics to create more realistic experiences, such as the recall of firing a gun. And not only do networked games allow real-time conversations with other players, they use artificial intelligence (AI), in particular generative AI, to make interactions with non-player characters (NPCs) feel a lot more realistic. All of the above advances in technology have contributed to turning games into completely immersive experiences.

While on the one hand, these technologies provide benefits of playing a video game, on the other hand, the increasingly immersive experiences can become a problem if a child or young person is deeply immersed in a game that is not age appropriate or that they are not emotionally ready for. It is then that we start to see a blurring of boundaries where game play starts to become reality, rather than the other way around. Of course, this is the case with other digital experiences as well, not just video games, but it is an important reason why we must talk to young people about games, gameplay and the challenges that come with being immersed in a game.

Do video games make young people more violent?

A considerable body of research into children and video games has focused on violent content and its potential to affect children's behaviour offline. This remains a controversial and often debated topic as much of the evidence has been inconsistent or methodologically flawed (Przybylski & Weinstein, 2019).

Some studies have found evidence that violent video games are associated with more violent thoughts or behaviours, while others find no such association. Generally, when effects are found, they tend to be small, suggesting that other factors such as children's exposure to violence in the home, school or community and experiences of negativity or interpersonal violence may be more significant drivers (Hern, 2020).

While the evidence overall suggests that playing video games will not make young people more violent, playing games that are not age appropriate or games that young people are not emotionally ready for can have an impact on their health and wellbeing. Talking to young people about their gameplay is an important strategy to make sure they can access the support they need after seeing something or doing something in a video game that they are not comfortable with.

There are lots of resources out there that provide advice to educators, parents, and carers about talking to children and young people about video games. A good place that aggregates a lot of this information is www.betterinternetforkids.eu. Here, you can access general advice and search for resources in different languages and by age range. The database does not just include resources for video games but for all aspects of online digital safety.

Video game payment systems

One big change to the video game industry in recent decades is the financial models of how games are funded. Many games are now networked and include in-game purchases or are 'freemium'.

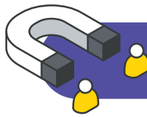
A freemium game is free to download but as you progress through the game, you may be asked to pay to progress faster or access additional features. These are optional payments and come in the form of micro-payments, either to unlock different levels of the game, accelerate your progress in the game or release digital artefacts, which enhance game play. The term was made famous by the Angry Birds game, which became the first downloadable freemium game in 2009 and went on to be the start of an Angry Birds Media ecosystem.

One of the challenges of freemium is that it is very popular on mobile platforms and quite often, these mobile platforms are linked to online payment systems, such as bank details and credit cards. In 2020, PEGI (Pan European Game Information, more details below) added additional feature descriptors about games that provide greater transparency for in-game purchases that include random items (such as loot boxes, card packs or prize wheels). This information is displayed as a notice on physical packaging and on digital storefronts. It provides a clearer and more specific label for parents and players to indicate if loot boxes and other randomised mechanics are present prior to purchase.

While you occasionally hear news stories of young people making extravagant online purchases without their parents' knowledge[2], the reality of this is that these cases are often anecdotal and almost always occur where parents have not set parental controls. According to the annual GameTrack survey, conducted by Ipsos and commissioned by Video Games Europe, in 2020, the vast majority – 75 % – of parents that have children who play video games claim that their child does not spend money in the game. 75 % of the parents surveyed whose children spend money in-game have an agreement of some kind with their children regarding spending and many have controls in place. Importantly, there is a policy among video game companies to reimburse families when there is a manifest error of spending.

Despite these policies, we have a role as education professionals to help children, young people and their families understand micropayments and in-game purchases.

2 With children off school and gaming online, parents face shock bills | Money | The Guardian



Video game addiction

Video game addiction is generally defined as a psychological addiction that is a problematic, compulsive use of video games that results in significant impairment to an individual's ability to function in various life domains over a prolonged period of time. This and associated concepts have been the subject of considerable research, debate and discussion among experts in several disciplines and has generated controversy within the medical, scientific, and gaming communities.

The World Health Organization included gaming disorder in the 11th revision of its International Classification of Diseases. Controversy around the diagnosis includes whether the disorder is a separate clinical entity or a manifestation of underlying psychiatric disorders. Research has approached the question from a variety of viewpoints, with no universally standardised or agreed definitions, leading to difficulties in developing evidence-based recommendations. However, the WHO confirms that studies suggest that gaming disorder affects only a small proportion of people who engage in digital- or video-gaming activities.

The reality is that too much of anything that you enjoy has got the potential to be addictive. The debate around screen time is also surrounded by controversy because the debate cannot simply be about time in front of a screen, it has to be equally about what you are doing with the screen. There is a fundamental difference between passively consuming content and building or making content, such as the game design that we discussed in chapter 5.

Setting household rules and managing screen time is a good idea. However, it has always been important that parents try to stay flexible because sometimes if they are not familiar with the rhythm of a game, it can be hard to understand why 'five more minutes' is important. We will look at parent controls for setting screen time below.

As well as www.betterinternetforkids.eu (mentioned above) the resources from seizethecontrols.eu are really helpful and include some conversation scripts to help get dialogue started between adults and young people.

Challenging stereotypes and discrimination

It is important that education professionals discuss the unrealistic representations of people and behaviours that can sometimes be found in video games. This can help children and young people understand conflicting feelings around not seeing themselves in the characters they play on screen. It can limit the impact on their body image, and it can also encourage appropriate and responsible behaviours both digitally and in the physical world.

In social psychology, a **stereotype** is a generalised belief about a particular category of people. It is an expectation that people might have about everyone in a particular group. The type of expectation can vary; it can be, for example, an expectation about the group's personality, preferences, appearance or ability. Stereotypes are usually overgeneralised, inaccurate and resistant to new information, but can sometimes be accurate. Stereotypes and biases can lead to **discrimination**. Discrimination means treating a person unfairly because of who they are or because they have certain characteristics.

PEGI has a content classification for discrimination (see below). A video game that is given the discrimination classification is a game that contains depictions of ethnic, religious, nationalistic or other stereotypes that are likely to encourage hatred. This content is always restricted and has a PEGI 18 rating. Of the over 35,000 games that have been classified by PEGI since 2003, only five have been classified with a discrimination label and no games have been classified with this label since 2007.

This means that there are very few video games on the market that actively expose players to discrimination. However, there are still a number of games that unconsciously reinforce stereotypes that have the potential to lead to discrimination or impact the health and wellbeing of children and young people.

When we think about who plays video games, many people still have an unconscious bias of who a 'typical video game player' might be and what they might look like. Often, we think of gamers as being male, white and young because in the past, this is how games have been portrayed in the media[3]. However, we already know from chapter 1 that the diversity of video game players has expanded considerably in recent years. These types of stereotypes are also reflected in the characters on-screen that we addressed in chapter 5.

3 Nearly 80% of Video Game Characters Are Male, According To New Diversity Study (newsweek.com)

Characters in gaming can also often uphold unrealistic beauty standards, which can have a negative impact on self-esteem for young people and in particular girls. In some cases, games might include characters with different abilities on-screen but portray them in a manner that reinforces harmful stereotypes. For example, a study found that over half of the top games of 2018 include characters with physical disabilities (Mindless Mag, 2022). However, 53 % of those characters were also likely to get 'fixed' during the game – such as being replaced by superhuman powers or prosthetics – deepening the prejudice that people with physical disabilities are somehow 'broken'.

Video game companies are aware of the problem and some progress has been made to make gaming spaces more inclusive, representative and safe. For example, Dove has partnered with Women in Games and Epic Games' Unreal Engine to launch Real Virtual Beauty, 'A first-of-its-kind coalition to encourage developers to create a healthier, more diverse representation of women and girls in games, worldwide'. The 'Do I Look Like a Gamer?' campaign movement also aims to inspire young people from underrepresented groups to gain valuable insights into career paths in the gaming industry and connect them with professionals and peers in a way that will hopefully widen their aspirations.

Video games such as **Hellblade: Shenua's Sacrifice** and **Marvel's Spider-Man: Miles Morales** feature non-stereotypical characters with physical and mental disabilities. Games with significant LGBTQ+ storylines are also on the rise, with games like **Fallout 4**, **Life is Strange 2**, **Dream Daddy** and **The Last of Us,** which all have prominent LGBTQ+ characters and character interactions. In addition, more and more games allow players to customise

characters, which gives players an opportunity to explore identity. While other games have a progressive stance on sexuality such as **The Sims** and **Assassins Creed Odyssey,** where players are free to enter relationships with whomever they like, these examples are still exceptions to the rule.

Useful resources to help support teaching about stereotypes in video games include the Real Virtual Beauty Parent Guide. Younger students might enjoy the Super U Story built in Roblox, which centres around 'The Academy', a school for kids with superpowers that's under siege by a group of rogue students spreading negativity. The mission is to help players find their unique superpower of flight, fire, water or speed to dodge and destroy the poisonous negativity and help save The Academy from being destroyed.

Pan European Game Information (PEGI)

The Pan European Game Information, usually known as PEGI (www.pegi.info) is a classification system for video games that is available across most of Europe. It is essential for teachers to understand the PEGI system to ensure video games used in the classroom are appropriate for use with their students and so they can raise awareness of the system amongst students and their families.

PEGI is currently available in 39 countries and has existed since 2003. PEGI is an information system that guides parents and video game players to make informed decisions when buying games. It is supported by console manufacturers, who require a PEGI rating on all games published on their console and is implemented in law in some countries across Europe.

There are two levels of information that PEGI provides for video games, one is the age category and the other is the content description. The PEGI age classification is divided into five categories: 3+, 7+, 12+, 16+ and 18+. The important thing about PEGI ratings is they are not based on difficulty but suitability for the age range. So, a PEGI 3+ game will not contain any inappropriate content but can sometimes be too difficult to master for younger children. On the other hand, there are PEGI 18+ games that are very easy to play, yet they contain elements that make them inappropriate for a younger audience.

The other classification that PEGI offers is what are called content descriptors. There are content descriptors for:

- Violence,
- Bad language,
- Fear and horror,
- Sex,
- Drugs,
- Gambling,
- Discrimination,
- In-game purchases.

Depending on the age range, the actual content descriptors might refer to different types of content. For example, descriptions of violence in games rated 7+ can only be non-realistic or non-detailed violence. Games with a 12+ rating can include realistic violence towards fantasy characters, and non-realistic violence towards human-like characters. Games rated 16+ will feature realistic violence towards human-like characters and 18+ can have increasingly realistic violence.

Some video games have been reclassified over time. For example, in 2022, Roblox had its age rating changed from a PEGI 7 age rating to the Parental Guidance label. The reason for this is that Roblox is considered as a platform with diverse content rather than an individual game product. A Parental Guidance label is an icon displaying an exclamation mark that is always accompanied by the '*parental guidance recommended*' text descriptor.

Experts in the PEGI expert groups are constantly reviewing the criteria of PEGI to make sure that the classifications evolve with the content that's available for gamers. In 2013, PEGI co-founded the International Age Rating Coalition (IARC), a global cooperation of age rating boards to provide the fast-moving mobile and digital markets with a scalable solution to implement familiar age rating systems. PEGI ratings are also used in Google Play for all Android devices and in other digital storefronts like the Microsoft Store, the PlayStation Store, the Nintendo eShop and the Oculus store. It is important to note that the Apple App Store does not follow the PEGI system but uses its own categories and age ratings.

Video game parental controls

Parental control is a service offered by all gaming consoles, handheld devices and operating systems for PC and Mac. Parental control settings allow parents and carers to protect their children's privacy and online safety according to various parameters. It is important for teachers to be aware of parental controls so that they can support parents and carers in working with their children on responsible video game use.

With parental control tools, adults can:

★ select which games children are allowed to play (based on the PEGI age ratings),

★ control and monitor the use of digital purchases,

★ limit access to internet browsing by applying a filter,

★ control the amount of time that children can spend playing games,

★ control the level of online interaction (chat) and exchange of data (text messages, user-generated content).

You can find information about parental controls for all major game consoles and different types of smartphones on the PEGI website under the responsible gameplay section – www.isfe.eu/responsible-gameplay/parental-controls.

While parental control tools are important, the industry encourages parents and carers to show an interest in the games their children like to play, play with them and talk with them about responsible gameplay and their online behaviour. Today's digital environment is an integral part of modern society and parents and carers need to engage with their children in their digital activities just as they would in their children's artistic, musical and physical activities. The video game industry has national forums and websites in place for this specific purpose. Click below to access country-specific information. You can also consult PEGI's tips for parents: https://pegi.info/page/tips-parents.

If you are an educational professional, it is important to signpost parents and carers to the above websites. Many schools provide links to these websites on their own school websites so that parents and carers can find this useful information to help keep their children safe online and help engage in responsible gameplay.

Key takeaways

★ Teachers must talk to young people about games, gameplay and the challenges that come with being immersed in a game.

★ Talking to young people about their gameplay is an important strategy to make sure they can access the support they need after seeing something or doing something in a video game that they are not comfortable with.

★ Teachers need to help children, young people and their families understand micropayments and in-game purchases.

★ Teachers should be aware of and make use of resources that can support children and their families in making responsible game play decisions, such as limiting the amount of time children spend on playing video games.

★ It is important that education professionals discuss the unrealistic representations of people and behaviours that can sometimes be found in video games.

★ The PEGI classification system offers useful information for teachers about the age appropriateness of video games and the type of potentially problematic content that exists in a game.

★ It is important for teachers to be aware of parental controls so that they can support parents and carers in working with their children on responsible video game use.

Further resources and chapter references

Games in Schools MOOC videos:

★ Talking to young people and parents about games,

★ Evolution of Games,

★ Challenging Stereotypes,

★ PEGI and Parental Controls.

Other Resources:

★ Responsible gameplay in your country – a list of initiatives and resources from across Europe provided by members of Video Games Europe,

★ Definition of 'freemium',

★ PEGI ratings,

★ From the annual Game Track survey, conducted by Ipsos MORI and commissioned by Interactive Software Federation of Europe, in 2020 75 % of surveyed parents whose children spend money in-game have an agreement of some kind with their children regarding spending,

★ Definition of 'haptic technology'.

★ Key events in the evolution of the games industry:

★ Article from the World Economic Forum looking at the history and evolution of the video game industry from the 1970s to 2020,

★ When PacMan generated $1billion in a year in the USA in 1980,

★ When Angry Birds became the first downloadable freemium game in 2009 and launched a media franchise,

★ The launch of the Twitch video streaming service in 2011,

★ When Grand theft Auto V earned $800 million in its first launch day in 2013.

Example of Mario showing the changes due to advances in technology:

★ Mario from the Nintendo Entertainment System (1985),

★ Mario from the Nintendo Entertainment System (2023).

Chapter references:

Hern, A. (2020). Playing video games doesn't lead to violent behaviour, study shows. The Guardian. https://www.theguardian.com/games/2020/jul/22/playing-video-games-doesnt-lead-to-violent-behaviour-study-shows

Mindless Mag (2022) Disability Representation in Video Games. https://www.mindlessmag.com/post/disability-representation-in-video-games

Przybylski, A. K., & Weinstein, N. (2019). Violent video game engagement is not associated with adolescents' aggressive behaviour: Evidence from a registered report. *Royal Society open science*, *6*(2), 171474.

Annex:
Lesson plans

The following lesson plans were developed by participants of the Games in Schools MOOC in 2020 and can offer some further ideas and inspiration for using video games in the classroom.

1. Digital storytelling with Minecraft
2. Celebrating the 500th Anniversary of the World's first Circumnavigation
3. House and furniture in English
4. Kung Pao chicken recipe
5. Minecraft village

Lesson plan 1: Digital storytelling with Minecraft

Author: Sofronia Maravelaki

Context:

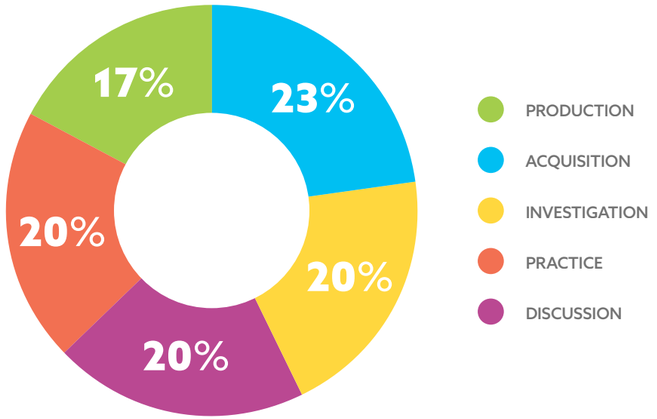
Topic: Narrating a true story.

Designed learning time: 2 hours and 30 minutes.

Size of class: 20 students.

Mode of delivery: Classroom-based.

Description: This lesson is an attempt to make students familiar with the story of Mohammad Aljaleel, the 'cat man of Aleppo'. His story touched the hearts of millions when his sanctuary was featured in a BBC video in 2016. He had to leave the city when it fell to Syrian government forces, but he went back – in an area nearby – to help both children and animals. To play the game, students have to recreate Aljaleel's story as a game in Minecraft and try to figure out ways to create a digital version of Ernesto's Sanctuary, the shelter that he built for cats in the middle of a war crisis. The general aim of the lesson is to raise students' awareness of social and controversial issues, such as the implications of war, refugees, animals, and children as victims of war, solidarity, volunteering, and the power of social media in the 21st century. The lesson also aims to familiarise students with the Minecraft digital environment and make them practice their English language skills to narrate a story (reading and writing), as well as their ICT skills.



Aims:

- Brainstorm and generate ideas and opinions,
- Sum up and categorise information in a table,
- Build a story as a game inside Minecraft Education Edition tools,
- Play games,
- Evaluate games,
- Gain Digital Badges for recognition of achievement,
- Communicate,
- Collaborate,
- Create, produce
- Publish,
- Evaluate.

Teaching-learning activities (TLA):

Module 1: Introduction to the story of the cat man of Aleppo

This lesson is designed to help students brainstorm and generate ideas and opinions, sum up and categorise information in a table.

	Read Watch Listen: 10 minutes
	20 students
	Tutor is available
	Face-to-face

Students watch a video about the cat man of Aleppo, a man from Aleppo, who set up a shelter for cats in the middle of a war crisis. Aleppo is a city in Syria, serving as the capital of the Aleppo Governorate, the most populous Syrian governorate. With an official population of 4.6 million in 2010, Aleppo was the largest Syrian city before the Syrian Civil War.

Linked resources:

- BBC – Return of the cat man of Aleppo,
- Mohammad Aljaleel.

	Discuss: 10 minutes
	20 students
	Tutor is available
	Face-to-face

Students discuss the videos they watched and brainstorm ideas on the ways and means this man used in order to build the shelter, achieve funding, and provide medical care for the cats.

	Investigate: 30 minutes
	4 students
	Tutor is available
	Face-to-face

Students form groups of four in front of a PC or laptop and access a website which presents the story of Mohammad Aljaleel and his charity work with cats up until this day. They read the information on the website and try to verify the answers to the questions from the previous brainstorming activity. After reading the information on the website, students have to fill in a table with information from the web page and ideas of their own. The table includes sections such as: time, place, people, funding, services, etc.

Linked resources:

- House of Cats Ernesto.

Outcomes:

Knowledge

- Find out/Discover,
- Identify,
- Select,
- List.

Comprehension

- Describe reasons for,
- Summarise,
- Classify.

TLA linked resources:

- BBC – The cat man of Aleppo,
- Mohammad Aljaleel.

Module 2:
Building the story of the cat man of Aleppo and Ernesto's Sanctuary as a game inside Minecraft

This lesson is designed to provide an opportunity to combine world building with storytelling while using many of the Minecraft Education Edition tools.

Credits: The module on Minecraft is inspired by: https://education.minecraft.net/fr-fr/lessons/fairy-tales, a sample lesson plan in https://education.minecraft.net/fr-fr/resources/language-arts-subject-kit, submitted by Steve Isaacs. It was adapted to fit the aims and objectives of this lesson and helps to navigate the Minecraft world of Language Arts.

	Read Watch Listen: 25 minutes
	20 students
	Tutor is available
	Face-to-face

The teacher provides a short demonstration of the use of the world builder and narrative tools in *Minecraft: Education Edition*. Narrative tools, which can be used include: find and place in inventory; slate, poster, board, sign, NPC. Etc. The teacher also provides a short demo of placing and using these tools to develop story within Minecraft.

Linked resources:

Minecraft Education Edition

	Produce: 25 minutes
	4 students
	Tutor is available
	Face-to-face

The purpose here is for students to form groups and recreate the story of the cat man in Minecraft. Students also build the world of Ernesto's sanctuary and incorporate the narrative. As an extension activity, students can add elements using *redstone* and other tools to create a more interactive experience for the reader.

Linked resources:

- Minecraft Education Edition.

Outcomes:

Application

- Construct,
- Assemble,
- Use.

Analysis

- Analyse,
- Break down,
- List component parts of,
- Predict,
- Relate,
- Select,
- Subdivide.

Synthesis

- Combine,
- Compile,
- Compose,
- Conclude,
- Derive,
- Design.

TLA linked resources:

- Minecraft Education.

Module 3:
Play, evaluation and digital badges

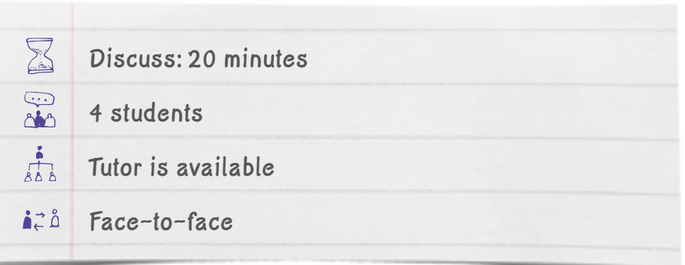
This lesson is designed to provide the students with an opportunity to present and play their story in Minecraft, peer-evaluate it, and earn digital badges in recognition of achievement.

	Practice: 30 minutes
	4 students
	Tutor is available
	Face-to-face

Students publish their completed work to be shared with a global audience at Minecraft Communities. This way each team can find online the other team's game and play their version of the story. The game can be played in the school computer lab (or at home to save teaching time at school). Once students have played the game, each team evaluates the version of the story they played, according to the criteria identified in the next activity.

Linked resources:

- Minecraft Communities.



The teacher creates a digital credentials rubric using Credly's intuitive Credential Dashboard to provide students with an achievement recognition system. Students can use the following set of criteria to evaluate the work of their classmates.

Objectives and performance indicators:

★ Students have successfully recreated the story of the cat man of Aleppo inside Minecraft,

★ Students demonstrate an understanding of digital storytelling, guiding the viewer throughout the complete story experience,

★ Students demonstrate an understanding of the narrative tools used in Minecraft Education edition (slate, poster, board, signs, NPCs),

★ Students demonstrate an understanding of the world builder tools including fill and clone tools and build Ernesto's Sanctuary inside Minecraft this way,

★ Students collaborate on the creation of their project and share responsibilities with other group members,

★ Students utilise *redstone* and other elements in the game to combine coding and engineering skills with storytelling.

Performance expectations:

All students will submit a completed story as a .mcworld file. Expectations include the following:

★ The story is complete, and the player can travel through its entire length,

★ Directions for the player are clear – they should know where to go and what the objectives are to prevent them from getting lost in the world,

★ A variety of narrative/storytelling tools should be used throughout including: slate, poster, board, sign, NPCs,

★ Students should use the fill and/or clone tool to make building more efficient and add interactive elements utilising *redstone*,

★ After the evaluation, students can present and share the digital badges they have earned.

Linked resources:

★ Credly.

Outcomes:

Evaluation:

★ Criticise,

★ Defend,

★ Evaluate,

★ Give arguments for and against,

★ Give feedback,

★ Judge,

★ Reflect,

★ Support.

TLA linked resources:

★ Minecraft Communities,

★ Credly.

Lesson plan 2: Celebrating the 500th anniversary of the world's first circumnavigation (1519-1522) – A cross-curricular learning design

Author: Candida Pombo

Context:

Topic: The world around us – the world seen by Magellan/Del Cano.

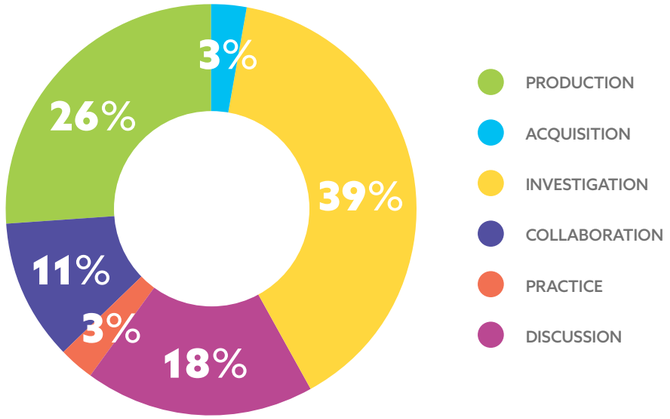
Designed learning time: 6 hours and 20 minutes.

Size of class: 30.

Mode of delivery: Classroom-based.

Description: Students develop a cross-curricular project, designed in collaboration with teachers and other students, about our knowledge of the world: the seas, the Earth and the skies, on the topic: 'The world around us/the world seen by Magellan/Del Cano'.

The subjects involved are: Portuguese language, English Foreign Language, Spanish Foreign Language, Biology, History, Geography, Math, Physics, and Citizenship Education.



Aims:

Students are expected to learn in a creative and immersive way, through the use of a range of digital games, and should be provided with a high degree of freedom and responsibility on their learning path. Collaboration through ICT is essential, and they must build substantive knowledge on the subject, as well as develop problem-solving skills.

Outcomes:

A cross-curricular project-work to be presented to the school community about the relevance of the first circumnavigation trip. Badges are awarded.

Teaching-Learning activities:

Discovering Magellan's/Del Cano's World

Discuss: 10 minutes
30 students
Tutor is available
Face-to-face

The teacher presents the project objectives, curriculum links, schedule and reinforces the focus on creativity and students' freedom to learn. Teachers and students together design and negotiate the assessment criteria.

Read Watch Listen: 10 minutes
30 students
Tutor is available
Face-to-face

In plenum, the students listen to and watch a video by NASA about the 500th Anniversary of Humanity's First Circumnavigation of Earth, by Games Garvin.

Linked resources:

★ Video about the 500th Anniversary of Humanity's First Circumnavigation of Earth.

- Practice: 10 minutes
- 1 student
- Tutor is available
- Face-to-face

After watching the video, students start playing Microsoft Flight Simulator X, to explore the areas of the world navigated by Magellan/Del Cano. The 'Flying Simulation' becomes the starting point for the project-work.

- Investigate: 30 minutes
- 5 students
- Tutor is available
- Face-to-face

Students are divided in groups and asked to carry out research. Going 500 years back in time, students are asked to replace their planes from the simulator with ships, considering the huge achievement of the Earth's circumnavigation. Based on their research, students suggest which areas of the world they would like to focus on within this project. Then, the two groups start working on their respective projects.

Playing/studying about Magellan's/Del Cano's World

- Investigate: 40 minutes
- 5 students
- Tutor is available
- Face-to-face

In Maths and Physics lessons, students study the sky, cartography, astronomy, and the stars, starting with the game/app Universe Sandbox and/or Flight Simulator X.

- Investigate: 40 minutes
- 5 students
- Tutor is available
- Face-to-face

In History classes, students research and write about the time of the discoveries, portraying the world's history around 1500. They identify the most important issues of Magellan's/Del Cano´s voyage, through Google Cardboard Design Lab and they take/share notes about them.

- Investigate: 40 minutes
- 5 students
- Tutor is available
- Face-to-face

In Portuguese classes, students read about and analyse the main characters, namely Magellan and write about his physical and psychological description and his biography. Students can use *Debojaan*, an immersive game, which helps them develop writing.

Collaborate: 40 minutes
5 students
Tutor is available
Face-to-face

In Biology lessons, students learn and debate about the oceans, their richness, as well as the current environmental threats we face through the Game 'Stop disasters'.

Produce: 40 minutes
5 students
Tutor is available
Face-to-face

In English and Spanish (as a second language) classes, students are expected to produce podcasts about the trip undertaken in the game in the two languages. Students can first train with the help of *Bravolol*, in order to practice their speaking competences and language skills.

Discuss: 40 minutes
5 students
Tutor is available
Face-to-face

Students, studying Citizenship Education and Ethics read and discuss about the so-called 'natives': their ways of living, cultural and ethnic differences, and habits. Moreover, they reflect on the issues society faced at the time, as well as on the evolution of human rights throughout the centuries.

Applying knowledge on Magellan's/Del Cano's World

Discuss: 20 minutes
30 students
Tutor is available
Face-to-face

Debate throughout the activity is carried out via the tool *Tricider* and the results of each groupwork are shared on different *Padlets*. In the end, just before the final task, the work of all groups is collated together in an ActiveTextbook: an interactive PDF shared with everyone in the community.

Produce: 1 hour
30 students
Tutor is available
Face-to-face

Through geocaching and utilising a mobile phone, students and teachers collectively organise and participate in a treasure hunt (the first circumnavigation trip) where they have the opportunity to put in practice all the knowledge gained so far. In this trip, the 'sailors' (students) land in specific places of the world, characterised by different species, different foods, cultures and people.

Lesson plan 3:
House and furniture in English

Author: Cristiana Lopes

Context:

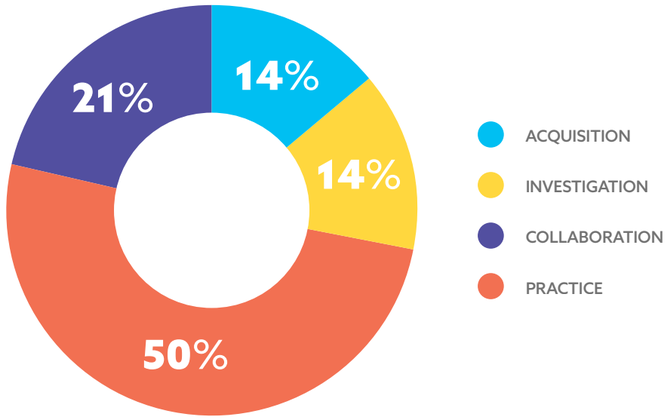
Topic: House and furniture.

Designed learning time: 1 hour and 10 minutes.

Size of class: 12.

Mode of delivery: Classroom-based.

Description: This is the first lesson on this topic. Students will learn the main parts of a house and some furniture in English. The lesson is designed for children in 4th grade, who study English as a Foreign Language.



Aims:

- To introduce children to the topic 'house and furniture' in a fun and engaging way,
- To engage children in cooperative tasks,
- To encourage children to research for words they need in English,
- To encourage children to be creative,
- To use games in the classroom.

Outcomes:

- **Knowledge:** Identifying vocabulary in English,
- **Psychomotor skills:** Movement and speed are required in the treasure hunt,
- **Comprehension:** Using Duolingo dictionary,
- **Application:** Designing a house.

Teaching-learning activities:

Sudoku game (easy level)

	Investigate: 10 minutes
	3 students
	Tutor is available
	Face-to-face

Children like being surprised. Teacher explains that the lesson has to be 'unlocked' and for that, students must solve a Sudoku puzzle in groups of three. They also need to pay attention to time. Each group receives a badge stating their position (1st, 2nd, 3rd, or 4th). This determines the order for the treasure hunt activity.

Linked resources:

- Sudoku for Children 4x4.

Notes:

This is a settler activity, important on a primary level, to start the class.

House - Geocaching or Treasure Hunt game

Read Watch Listen: 5 Minutes
12 students
Tutor is available
Face-to-face

At the end of the puzzle, the teacher shows a picture of a house with the word 'HOUSE' below. This is the topic of the lesson. Since this is the first lesson on the topic, children may not know any words yet.

Linked resources:

★ House Flashcard PT-EN.

Collaborate: 15 minutes
3 students
Tutor is available
Face-to-face

The teacher explains that some items of a toy house were previously hidden somewhere in the playground. Students have to search for them using the coordinates provided and find them, divided in groups of 3. If geocaching is too difficult, the exercise can be done without it. The teacher can then prepare a treasure map. Each group leaves the classroom in the order established in the Sudoku game, according to the badge each group received.

Practice: 10 minutes
12 students
Tutor is available
Face-to-face

After the treasure hunt, the class comes together again. Each group shows what they have found, and the objects are sorted in categories (also with the help of flashcards): kitchen, bathroom, bedroom, living room and dining room. Each group receives 10 points for each item it found. The teacher can then check if the words for the parts of the house were understood correctly.

Notes:

You need to hide small pieces of toy furniture in the playground and mark their location.

Rooms in a house - Playing Sims

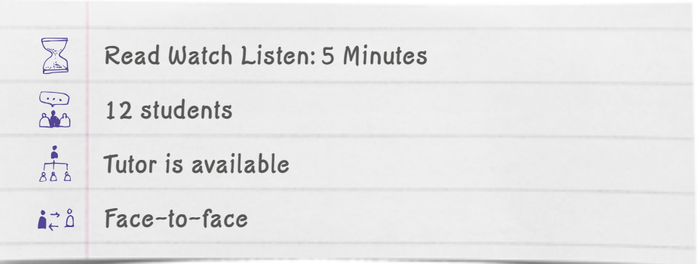
Practice: 25 minutes
3 students
Tutor is available
Face-to-face

Each group plays The Sims, but the children are only allowed to 'buy' the number of objects according to the points they got in the previous task. Students use the Duolingo dictionary option to learn the word for each furniture item in English. The teacher supports the groups and tries to assess their use of words.

Linked resources:

★ The Sims Freeplay,

★ Duolingo dictionary.



The teacher tells each group to save their project. The house they are building can be completed in the following lessons. This game can then be used to learn more words about daily routines and emotions.

Notes:

The teacher can use any version of the game available.

Each child is invited to create a painting for their houses at home, using the QuiverVision template. Next lesson, they will be surprised to see their painting as augmented reality.

TLA linked resource:

★ Quiver.

Lesson plan 4:
Kung Pao chicken recipe

Author: Güniz Çalışkan Kılıç

Context

Topic: Kung Pao chicken recipe.

Designed learning time: 2 hours and 5 minutes.

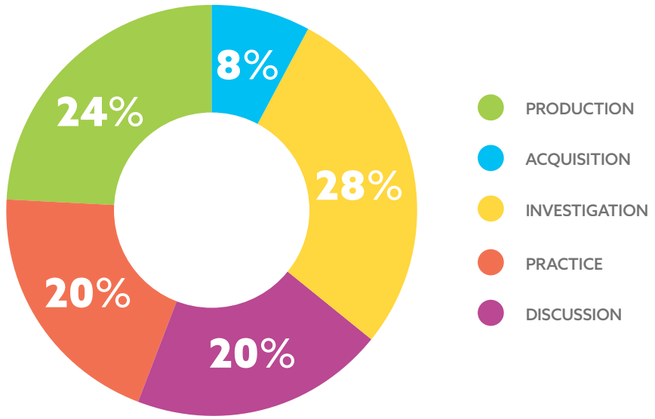
Size of class: 36.

Mode of delivery: Classroom-based.

Description: The recipe of the Kung Pao Chicken is within the game called World Cuisine. This game will help the students to have fun and learn at the same time.

Aims:

Students will be able to use the vocabulary about ingredients and instructions to write a recipe.



Outcomes:

Knowledge: Students will be able to list what they already know, and what they want to know about this meal.

Comprehension: Students will be able to summarise the ingredients and instructions to make this meal.

Application: Students will be able to make use of the vocabulary of ingredients and instruction to make another recipe of their preference. They will apply what they have learned to develop another recipe.

Teaching-learning activities:

Preparation and task 1:
Filling in the first to parts of a KWL chart

★ Wikipedia – KWL table.

	Read Watch Listen: 10 Minutes
	36 students
	Tutor is available
	Face-to-face

The teacher will write the name of the application on the board. The students will download the application called 'Cooking Academy 2 World Cuisine'. While they are downloading the application the teacher will make groups of six. The students are going to explore the game in their groups.

Linked resource:

★ World Cuisine.

Discuss: 15 minutes
6 students
Tutor is available
Face-to-face

The teacher will hand out the KWL chart and ask the students to fill in the first two parts (What we know, What we want to know) of the chart which is about the Chinese meal called Kung Pao Chicken. The students will write the name of their group on the worksheet and do the task in their group.

Linked resource:

★ KWL chart.

Investigate: 15 minutes
6 students
Tutor is available
Face-to-face

After filling in the handout, students will be given enough time to reach the 3rd level of the game. They will be motivated to investigate the game, as they will be given a further question from the KWL chart – to explain 'what they have learned'.

Notes:

Since not all students have mobile phones, there should be at least 1 or 2 phones per each group.

Task 2:
The students will be able to summarize the ingredients and instructions to make this meal

Investigate: 10 minutes
6 students
Tutor is not available
Face-to-face

In this task, the students are divided in groups and compete to get the highest number of points. While they play the game, they are going to encounter some words they have learned before , as well as some new ones. They will also be able to read about the origins of the meal at the beginning of the game.

Practice: 5 minutes
6 students
Tutor is available
Face-to-face

The teacher gives the second handout to the students. The students have to write a list of all the vocabulary related to the instructions and the ingredients, which they remember from the game.

Linked resource:

★ Instructions, Ingredients.

Discuss: 10 minutes
6 students
Tutor is available
Face-to-face

One leader from each group is designated to read out what the group wrote on the paper to the rest of the class. The students can use the discussion to add or remove words from their lists.


Investigate: 10 minutes

36 students

Tutor is available

Face-to-face

The teacher is going to stick the flashcards on the board and the students are going to check their work one more time.

Linked resources:

- ★ Flashcardsm,
- ★ Steps of Kung Pao chicken.


Produce: 10 minutes

1 student

Tutor is available

Face-to-face

Students write a simple recipe by using any of the ingredients mentioned before, applying what they have learned to develop another recipe. They can then stick their recipes on the board while leaving for the break. Curious students will be able to read all the recipes collated together.

Notes:

Naturally, some students will be quicker to understand the game, and others slower. The faster students can be given an opportunity to improve their scores so they will not get bored. If there is time left, the teacher can ask them to match the pictures to the steps.

Task 3:
The students will be able to use google drive in order to finish the KWL chart

Task 4:
The students will be able to fill in a chart of ingredients and instructions for one of the next levels of the game on their own


Produce: 20 minutes

6 students

Tutor is not available

Face-to-face

In this task, the students have to fill in the last part of KWL chart on google drive. They are going to arrange the 'What they have learned' part through their Google Drive account.

Linked resource:

- ★ How to use google drive.


Practice: 20

1 student

Tutor is not available

Face-to-face

The students are given an opportunity to make their own recipes, including pictures of the game which clearly shows the ingredients and instructions. Students are free to choose the recipe they want to create. Once finished, all recipes can be shared on the class bulletin boards.

Notes

If the students do not know how to use Google Drive the teacher can give them the handout attached. All students, who complete Task 4 within a week will be rewarded with a badge. After this step, students will subconsciously pay attention to the ingredients and instructions of the meal without having to fill in a chart.

Lesson Plan 5: Minecraft Village

Author: Barış Ertuğrul

Context:

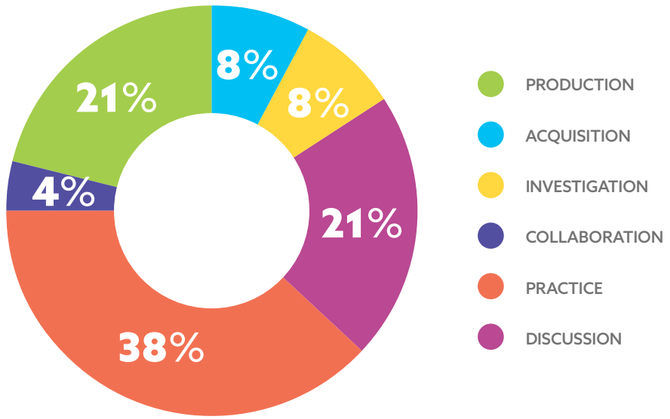
Topic: Importance of cooperation and division of labour.

Designed learning time: 2 hours.

Size of class: 15.

Description: To teach students the importance of collaboration and division of labor by taking advantage of group experiences on digital gaming. The course will be taught in 2 stages. Phase 1 is the uncoordinated phase in which individual actions are carried out, and the second phase is the planned implementation phase where the division of labor and cooperation are emphasized.

Mode of delivery: Blended.



Aims:

Improving students' collaboration and division of labor skills.

Outcomes:

- Define (Knowledge),
- Identify causes of (Comprehension),
- Evaluate (Evaluation),
- Show awareness of (Affective learning outcomes).

Teaching-learning activities:

Part 1: Unplanned Work in Minecraft

	Read Watch Listen: 5 minutes
	15 students
	Tutor is available
	Online

Students are shown a previously prepared minecraft village and they are asked to create the same village. However, they will not be able to communicate with each other. They are told that they should decide what to do and where. However, each of the students will have done part of the example village, but it is not clear who will do what. Students have 20 minutes to build the village.

Linked resource:

- Minecraft.

Practice: 25 minutes
15 students
Tutor is available
Online

All students are allowed to log into the set minecraft server and are allowed to play on it for 20 minutes.

Linked resources:

★ Minecraft.

Discuss: 10 minutes
15 students
Tutor is available
Face-to-face

After the game, the students and the students are asked to identify and evaluate the differences between the desired village structure and the village they create. In addition, students are asked to explain the problems they encounter during the formation of the village while they play the game and they are asked to explain and evaluate them.

Part 2:
Planned Work in Minecraft

Read Watch Listen: 5 minutes
15 students
Tutor is available
Online

The students are shown a similar minecraft village, which is prepared beforehand, and they are asked to form the village again, but this time they will select a leader from among them and will be divided into groups and assigned a task to each group. The students are informed that they will determine the leaders and the groups themselves and that they will make the task part again with their own decisions. In this part, students will be in contact with each other. The students are then given time to choose the leader, to separate the groups and to split the task.

Linked resources:

★ Minecraft.

Collaborate: 5 minutes
15 students
Tutor is available
Face-to-face

At this stage, the students should negotiate among themselves, choose a leader, identify the working groups and perform the task division. With small orientations, it is ensured that students make this preparation within the given time.

Practice: 20 minutes
15 students
Tutor is available
Online

Students are allowed to play Minecraft and try to create the requested village.

Linked resources:

★ Minecraft.

Discuss: 10 minutes
15 students
Tutor is available
Face-to-face

At the end of the period, all students leave the game. The students are asked to emphasize the differences between the two villages and evaluate their play experiences this time. They are then asked to make a comparison between their previous game experience and their last games. Finally, the teacher emphasizes the importance and benefits of cooperation and division of labor.

Part 3: **Consolidation**

Investigate: 10 minutes
15 students
Tutor is available
Face-to-face

The students are asked to discuss how they can work together to form another village and to make a division of tasks for this village.

Produce: 25 minutes
15 students
Tutor is available
Online

Students are allowed to play games to build the village they planned. In this section, students play again.

Linked resources:

★ Minecraft.

Discuss: 5 minutes
15 students
Tutor is available
Face-to-face

Students are asked to evaluate their village and their experiences.

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