

# Simulations and Serious Games



Learning Journey 2:  
Simulation and Serious Games

# Foreword



Digital technologies are impacting not only on the way we work and play but also on how we teach and learn. It is creating opportunities for Vocational Education and Training (VET) teacher/trainers, VET institutes and the VET sector to innovate how training and education is delivered.

This Learning Journey has been developed as part of the Erasmus+ project called **Enterprises Growing Through Business Simulations (E-Growth)**. This is about VET teacher/trainers in the use of **Technology Enhanced Learning (TEL)** within in VET courses. In addition to this set of seven **Learning Journeys**, the project has also developed a business simulation called, **PROSPER**, as an example of the use of TEL – the simulation supports the development of the knowledge and skills associated with running and growing an enterprise. The project has also published an e-book called, **A Guide to Technology Enhanced Learning in VET**.

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# LJ2: Simulation and Serious Games

This Learning Journey is called **Simulation and Serious Games**. It is part of a set of seven Learning Journeys exploring the use of TEL methodologies including Technology Enhanced Learning (TEL), e-assessment and e-portfolios and Virtual Learning Environments (VLEs).

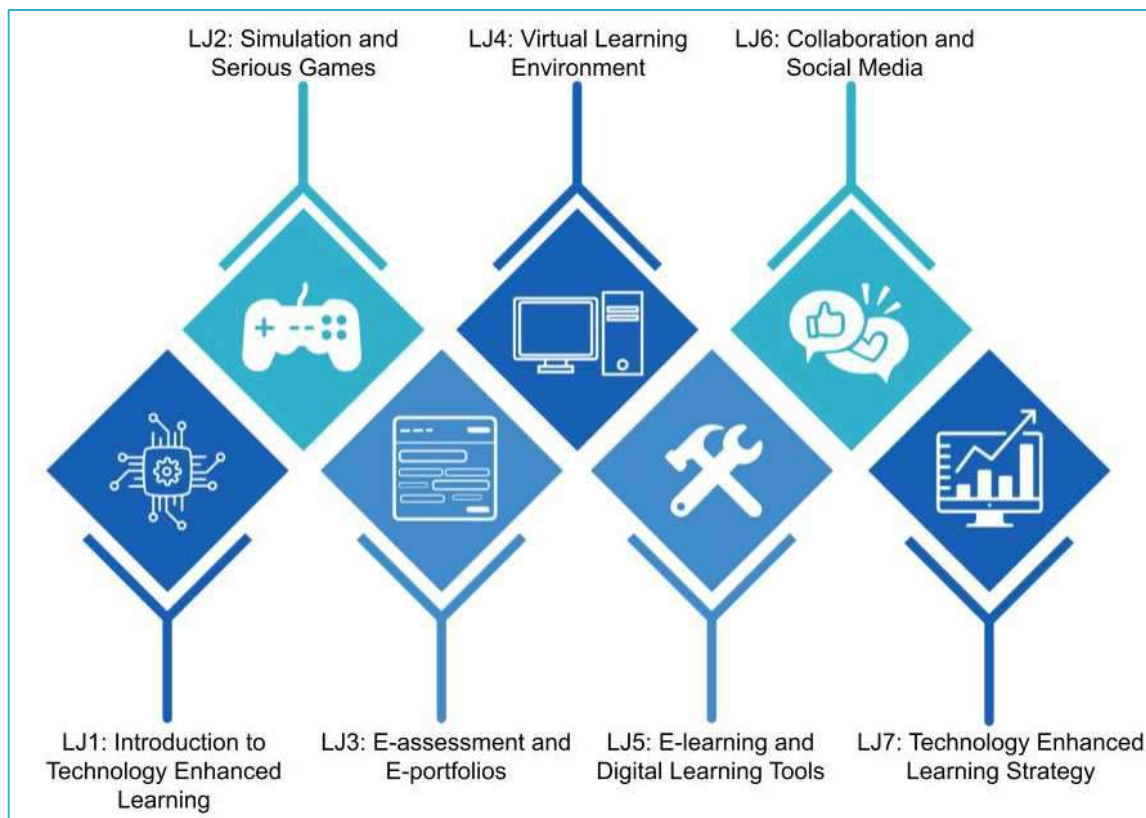


Figure 1: Learning Journeys - Technology Enhanced Learning

Each Learning Journey comprises an explanation of key terms, tools and methodologies. In some Learning Journeys, there are:

- Practical 'how to checklists'
- How to guides and
- Examples of digital tools

The last Learning Journey is designed to help you to plan and implement your own Technology Enhanced Learning Strategy.

# LJ2: Simulation and Serious Games



## Aim:

This unit is about the design and use of simulations and serious games to support effective learning

## Learning Outcomes:

- Be able to explain what is meant by the terms simulations and serious games
- Understand how to develop and use serious games to support effective learning
- Understand how to develop and use simulations to support effective learning

# Why Games?



**Games were invented to entertain, engage and motivate people.**

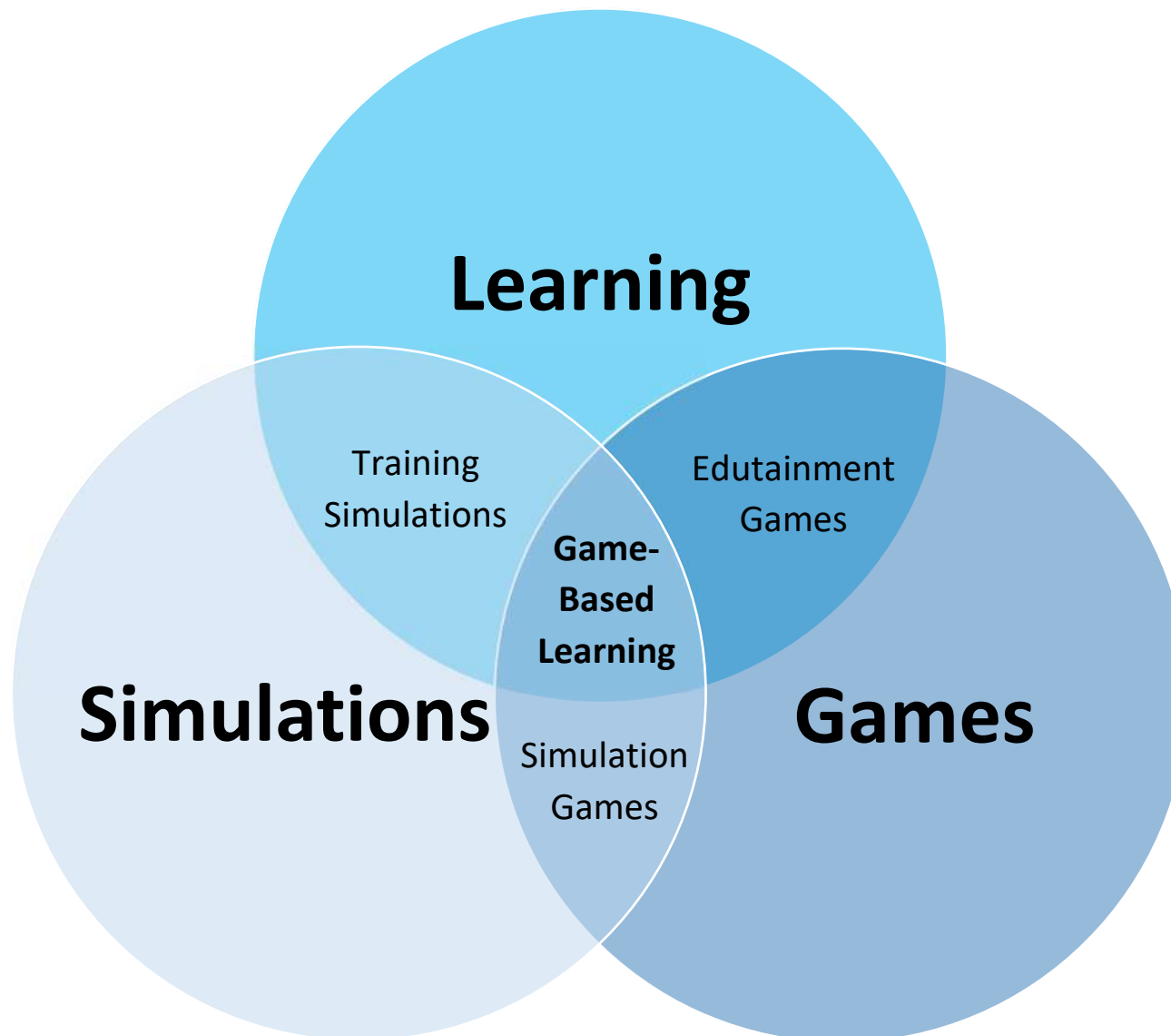
If we use this game frame and we add a value/curriculum to it from which the player can benefit, then **it can easily lead to knowledge gain or personal development.**

Games are very **powerful and versatile tools**, harvesting the potential that lies in them is beneficial for both teachers and learners.

The most important element of games is that **the player has a strong active role as a learner** and need to accomplish clear goals. The player has to make choices that has consequences which will influence the **progress**, which **is clearly communicated back to the player** through points, levels, achievements or any other feedback system.

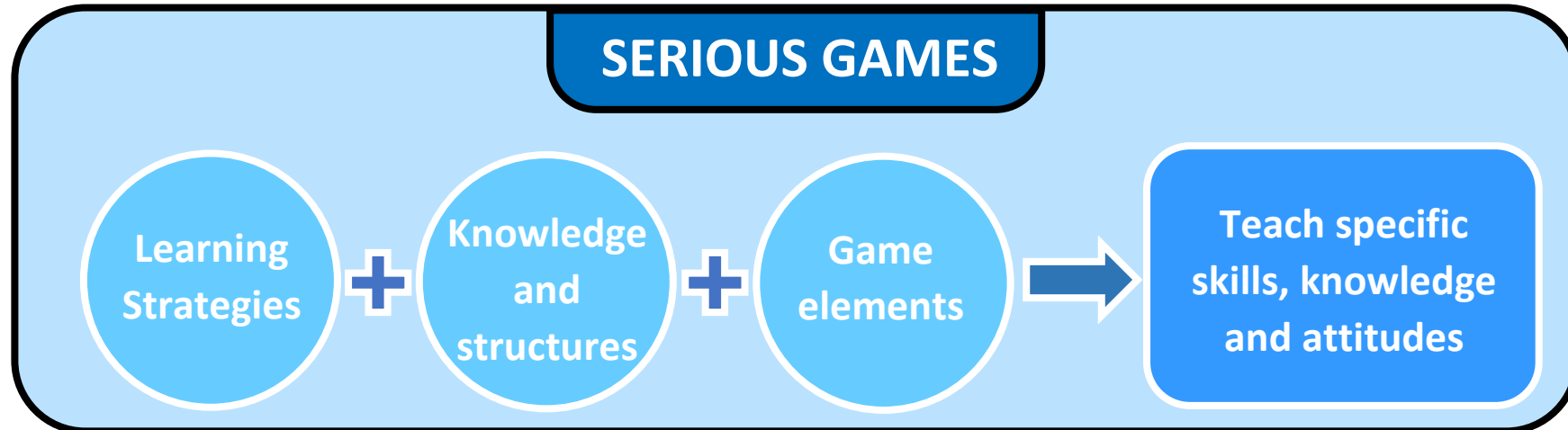


# Structure of Game-Based Learning:



# What are Serious Games?

**Serious games are games that have another purpose besides fun and entertainment.**



**Serious games combine learning strategies, knowledge and structures, and game elements to teach specific skills, knowledge and attitudes.**

They are used to promote learning and behaviour change and to encourage skills, knowledge and personal development in a versatile, innovative and engaging way.

They are using the entertainment and engagement components provided when the user is playing, and involve challenges and rewards which makes them entertaining, engaging and immersive.



# Applications

The use of serious games has recently grown at an incredible pace and they have been used in a range of areas such as:

## EDUCATION

Games are used to **teach specific subjects through gamified exercises and simulations**. This way, students can learn maths or learn a new language for example. This is one of the most well-known applications of serious games, also known as educational games.

## HEALTHCARE

The health sector for example includes digital games for the professional area of **doctor training, motivation tools for a healthier lifestyle**, or games for rehabilitation purposes. There is also an increasing use of serious games in health education programmes.

## SUSTAINABILITY

These games usually **raise awareness, educate**, and make people engaged for sustainability projects or encourage them to change their behaviour.

## TRAINING

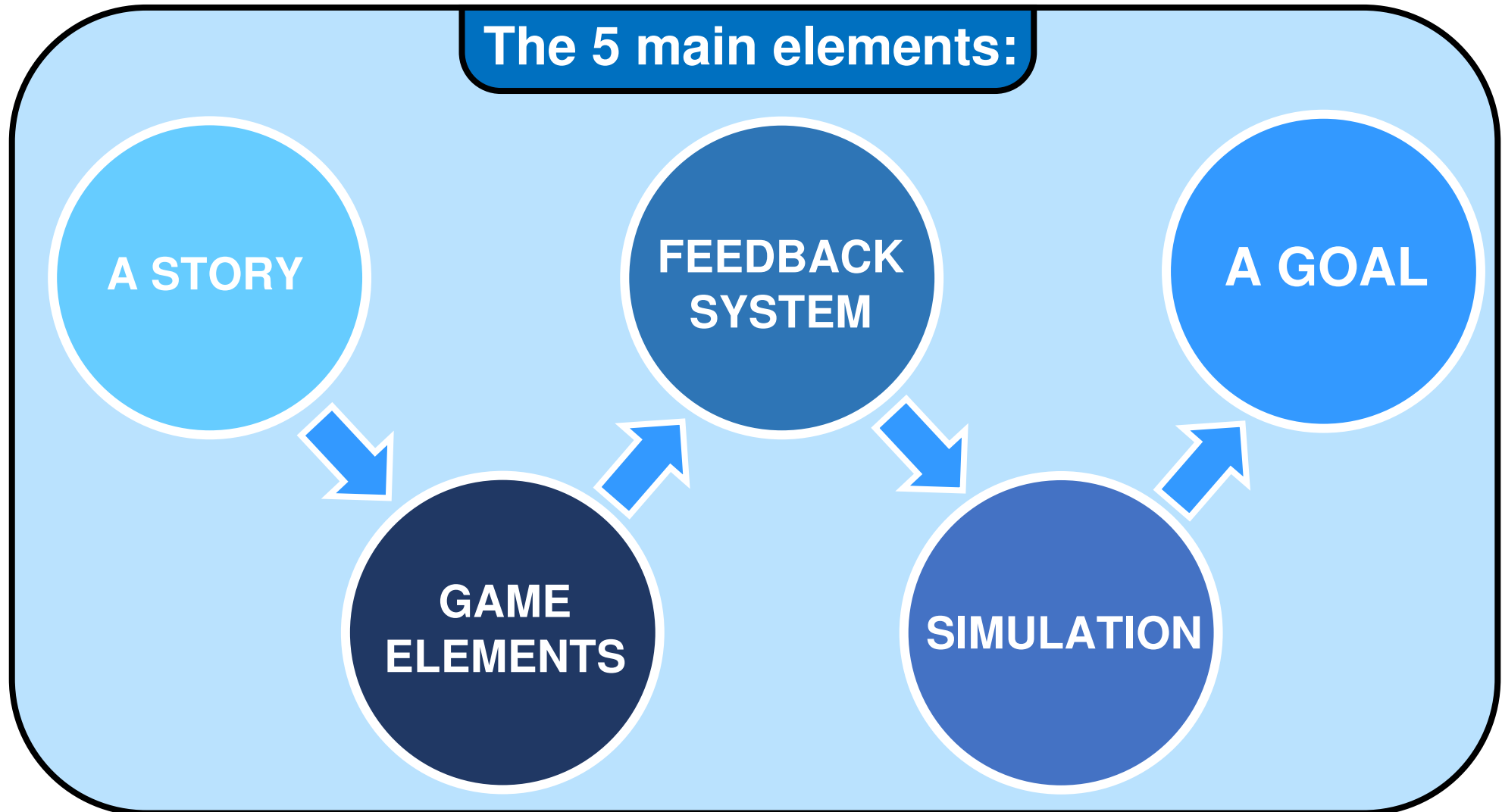
More and more company and consultancy agencies use serious games to **explain and train teamwork and social and logistic dynamics** within businesses.

The above are just a few areas where serious games are used. Additionally, they are also used in the military for training purposes, in marketing to acquire and retain customers, by governments to create social awareness and for several research purposes. In exercise therapy, politics, culture and advertising, security, recruitment, product creation, adult and youth education.

**There are many more as there are always new approaches and as we are just starting to discover the potential of games with a purpose.**

# The 5 Elements of Serious Games

There is a huge variety of formats and objectives, but most game-based learning systems tend to have five main elements.



# The 5 Elements: Element 1

## 1. The Story

# THE STORY

Although it is not essential, most video games have a main story just like movies.

The more sophisticated the story, the argument, the environment and the characters, the easier it will be to motivate the players and for them to get into the game which will give them the full-on experience.

**Example:** Pacific

The [game](#) starts with a story:

A team's plane crashes and they are trapped on an island in the middle of the Pacific Ocean. The player's objective is to lead their team while they build a hot-air balloon so that they can escape from the island and return home safe and sound. To do so, they have to learn all the virtues of a good leader and team manager (skills that every company is calling out for), including motivating and rewarding their colleagues, resolving conflicts, delegating tasks or coaching them. That is the only way they can hope to get off the island.



## 2. Gamification



# GAMIFICATION

The second fundamental element of any serious game is [the game dynamics](#), which include the rankings, rewards, badges or points systems. This gamification tends to animate and motivate the players: we all love to get more coins, obtain more lives or pass through to the next level. Classifications or rankings are also very important in serious games: healthy competition with our classmates or work colleagues encourage us to try that bit harder and to do everything possible to beat our rivals.

### **Example:** Duolingo

Many of these elements can be seen in the famous language application, [Duolingo](#). While users learn English, Spanish, French or German, they receive points, go up to the next level, lose lives or outdo their friends and relations. Each lesson they learn has a reward. Even though Duolingo is not strictly speaking a serious game, it is one of the most successful applications when it comes to using gamification elements for learning.



# The 5 Elements: Elements 3 and 4

## 3. Feedback

### FEEDBACK SYSTEM

As opposed to face-to-face, serious games offer immediate and personalised feedback. The player interacts directly with the game and instantly receives a reward or a punishment. In the most sophisticated video games, this feedback is also detailed and argued: users find out where they have gone wrong and can try to do better next time. If properly imparted, this feedback can be a powerful learning tool.

## 4. Simulation

### SIMULATION

In most cases, serious games reproduce or imitate real life situations. Using fictitious characters and by recreating scenarios, players find themselves immersed in a world similar to the one they will find beyond the screen of their computer or their cell phone. These simulators make it possible for users to interact with a new reality and to practice the skills and concepts they have acquired during the game. **Example:** The Virtual Interactive Combat Environment (VICE)



One of its best-known video games is [The Virtual Interactive Combat Environment \(VICE\)](#), which uses a sophisticated 3D simulator to allow military personnel to practice conflict resolution, how to use regulatory equipment, communicate with the rest of the team or act in a war scenario.

# The 5 Elements: Element 5

## 5. The Goal



It cannot be said enough:

**The key element of serious games is that their purpose is to teach something.**

All the elements mentioned above can be found in endless commercial video games, but that does not necessarily make them serious games. **As well as using all these elements, serious games also have to have a purpose that is not recreational and that almost always has to do with a certain educational or training aspect.**

# Advantages of Serious Games

When all the above elements are combined successfully, we have a powerful learning tool. **The use of a narrative, gamification techniques, simulators and feedback during the teaching process imply numerous benefits** when compared to face-to-face learning or e-learning. More and more companies are using games to achieve serious goals, not necessarily because something is wrong with the good old books, and e-learning methods, but **serious games are in most cases more engaging and efficient tools to transfer information and knowledge**. The benefits of using serious games are:

## Higher engagement and immersion:

Because of the way games are designed, they always motivate the player to keep on playing by using rewards, story progression or other feedback systems. Add a beautiful environment to this for complete immersion in the subject matter.

## A safe space to experiment:

In the real world your actions have consequences, sometimes this can lead to damaged material or hurt feelings. Games create a safe, virtual environment where players can experiment to their hearts content without having to worry about damage.

## Positive emotions improve learning:

It's fun! Studies have shown that students who use games to learn, experience more positive emotions. This leads to an improved learning experience when compared to traditional learning methods.

## Improves memorisation and retention:

One of the advantages of serious games is that by increasing the engagement and the motivation of the students, they also increase their memorisation and retention of what they have learnt. The students learn better and more deeply. Several scientific studies have proven that learning by doing makes a more effective and long-lasting impact on students' brains.

# How Serious Games Help the Learner

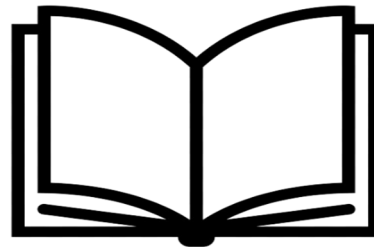
**In summary, serious games help the learner to learn:**

**In a serious game you as the player move into a virtual space, where you can safely do things.** A direct practice without risk. Here you can experiment, fail fast, explore without repercussions, try 'what if' scenarios and go to places that might otherwise be impossible. If you do not get it right the first or second time, you can simply try again.

In a serious game **the learner is guided, and the performance is tracked and measured.**

Serious games are more **effective and engaging.** They give **better transfer of learning from the game to real-life application;** they facilitate the memorisation and retention of knowledge.

They are also **motivating.**



While **serious games** have been around for centuries, the social and technological changes of recent years are extending game-based learning to the four corners of the planet. Whether it is to improve the training of nurses, to help primary school children learn geometry or to promote leadership skills among the employees of a company, serious games **have become one of the most practical and effective teaching tools in the world today.**





GRENDDEL GAMES' website is full of with interesting graphs, illustrations and articles about serious games and their application, supported with examples. Take a look at their website if you want to take a deep dive into the topic.

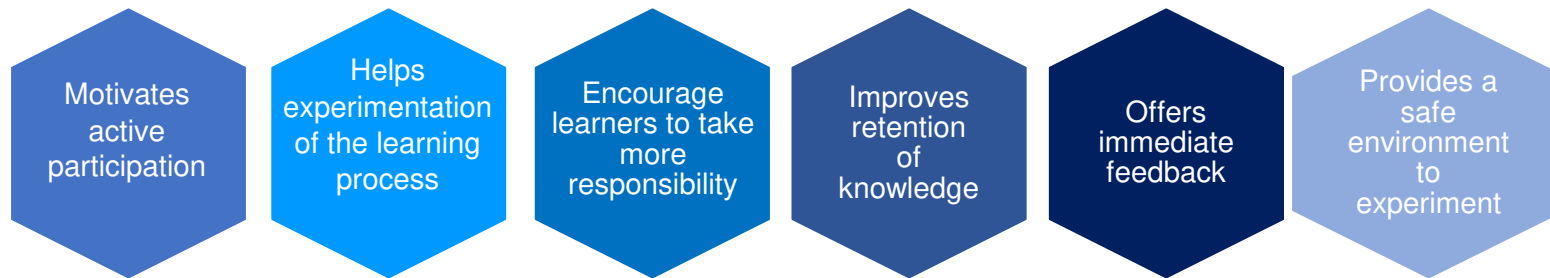
For example in the following article you can read about [five types of serious games](#) that aim to:

- **transfer knowledge**
- **teach skills**
- **create awareness**
- **change behaviour**
- **increase motivation**

# Why Use Simulations?

Serious Games can be built on a simulation framework, so that a serious game which is a simulation has a lot in common with the above.

Reasons to use simulations:



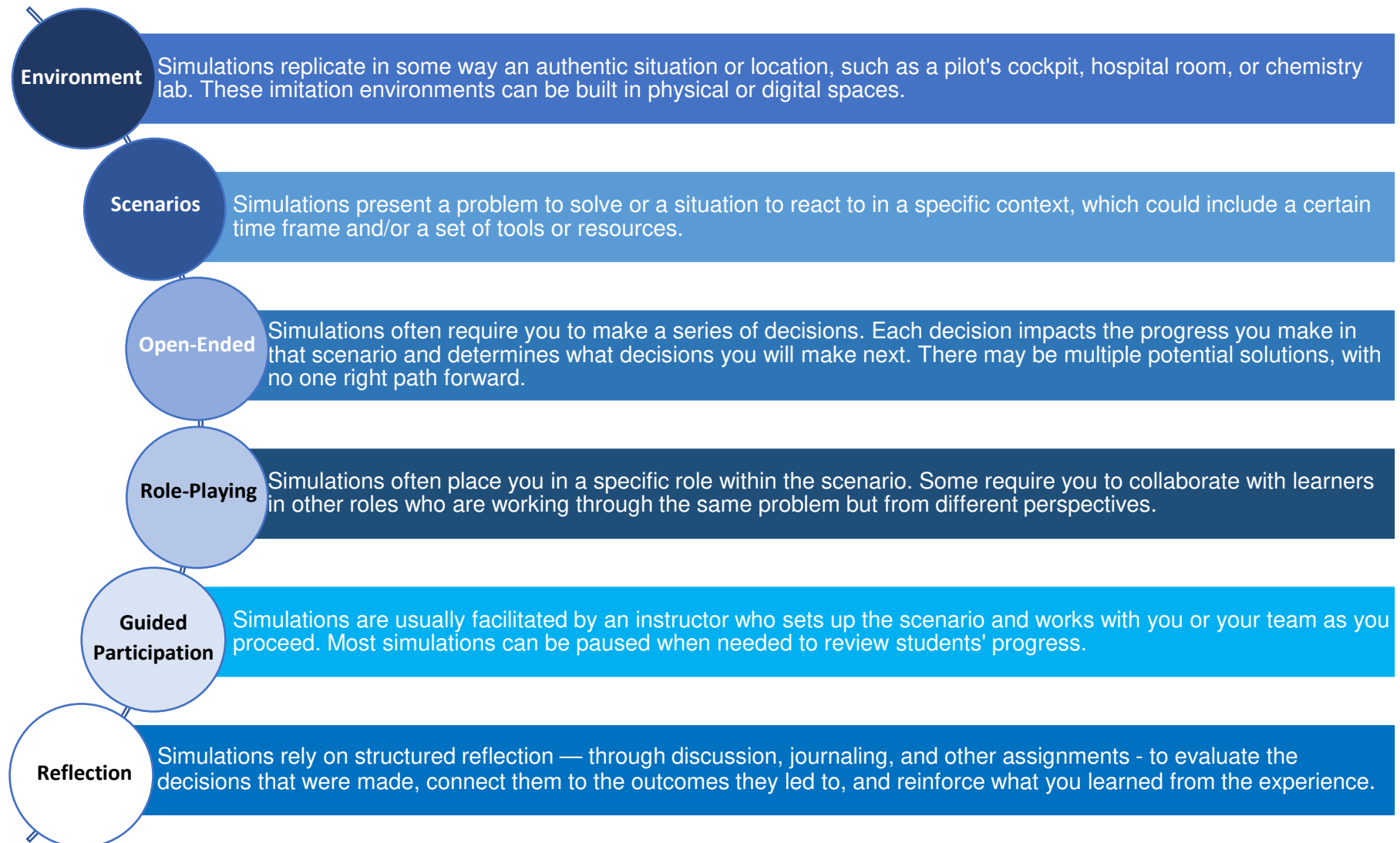
Simulations promote the use of critical and evaluative thinking. They encourage students to contemplate the implications of a scenario. The situation feels real and thus leads to more engaging interaction by learners.

**Simulation learning allows students to practice critical work skills in a controlled environment.**

Simulations promote concept attainment through experiential practice. They help students understand the nuances of a concept. Students often find them more deeply engaging than other activities, as they experience the activity first-hand, rather than hearing about it or seeing it.

# Main Elements of a Simulation:

Typically, simulations incorporate some or all of the following characteristics:



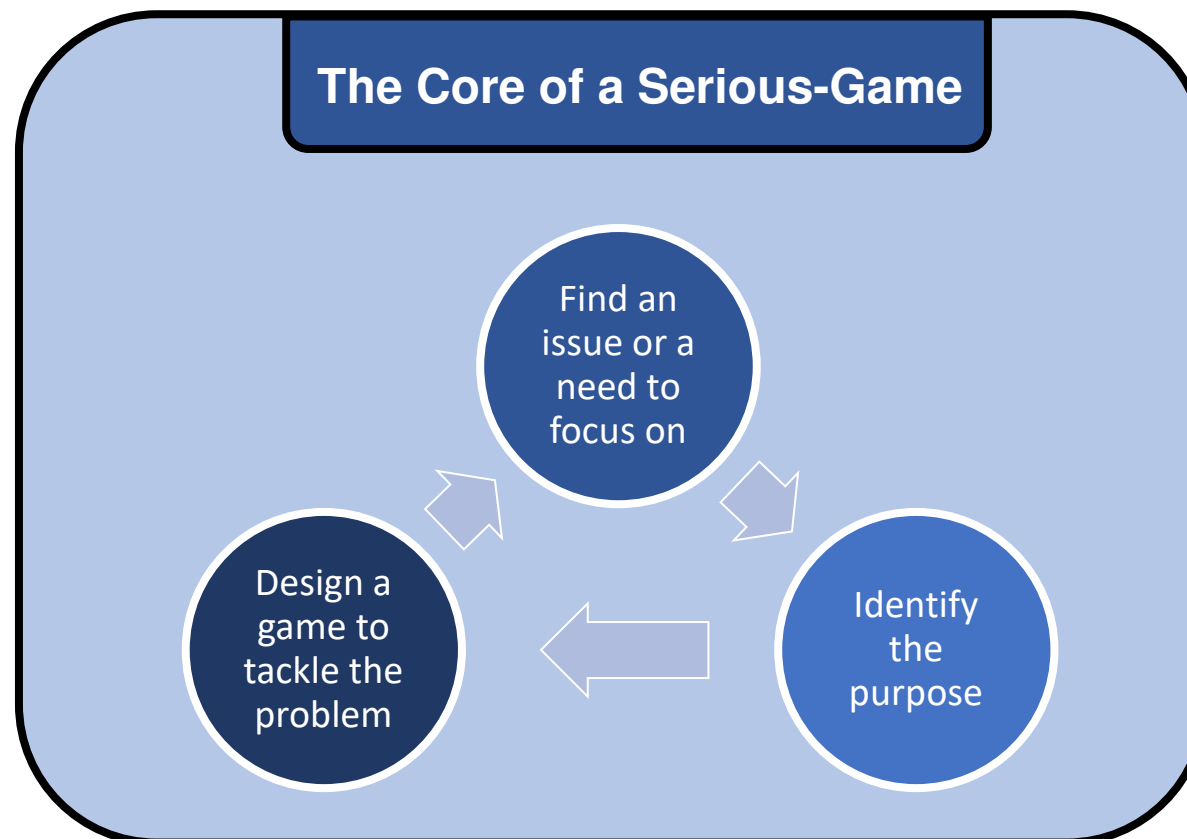
# Designing a Serious-Game

## How to design a Serious-Game

As it is true for many things in life, **there is no one good way to go**, although there are some tips and example that we can give you.

First of all, as mentioned above, **serious games have serious purpose** other than entertainment. When designing a serious game, you have to find an issue, or a need and then design your game accordingly, to tackle it.

You will have to keep in mind how you will evaluate if your game works and whether or not it can fulfil its role.



# Game Design Sheet Example

<table border="1"> <tr> <td style="background-color: #1a3d54; color: white;"><b>PURPOSE</b></td> <td colspan="4">Raising awareness on the importance and benefits of regular body-movement</td> </tr> <tr> <td style="background-color: #1a3d54; color: white;"><b>AIM</b></td> <td colspan="2">To make daily movement a habit while keeping it achievable and entertaining.</td> <td style="background-color: #1a3d54; color: white;"><b>IMPACT</b></td> <td colspan="1">Raised awareness. Incorporated movement related habits, healthier lifestyle.</td> </tr> </table>					<b>PURPOSE</b>	Raising awareness on the importance and benefits of regular body-movement				<b>AIM</b>	To make daily movement a habit while keeping it achievable and entertaining.		<b>IMPACT</b>	Raised awareness. Incorporated movement related habits, healthier lifestyle.
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<b>CONTENT &amp; INFORMATION</b>	<b>GAME MECHANICS</b>	<b>FICTION &amp; NARRATIVE</b>	<b>AESTHETICS &amp; GRAPHICS</b>	<b>FRAMING</b>										
<ul style="list-style-type: none"> <li>Information</li> <li>Facts</li> <li>Data offered &amp; used in game</li> </ul>	<ul style="list-style-type: none"> <li>Methods for interacting game world</li> <li>Rules for operation</li> <li>Operation of reward system</li> <li>Obstacles and challenges</li> <li>Difficulty</li> <li>Win condition</li> </ul>	<ul style="list-style-type: none"> <li>Fictional context</li> <li>Characters</li> <li>Settings</li> <li>Narrative</li> <li>Story</li> <li>Back stories</li> </ul>	<ul style="list-style-type: none"> <li>Fundamental to introduce the game purpose and experience to the player</li> <li>Audio, Visual, Heptics, Graphics</li> </ul>	<ul style="list-style-type: none"> <li>Target group</li> <li>Play literacy</li> <li>Broader topic</li> </ul>										
<ul style="list-style-type: none"> <li>Timer</li> <li>Interesting facts</li> <li>Score</li> <li>Milestone map</li> <li>Total achievements</li> </ul>	<ul style="list-style-type: none"> <li>Achieving goals, collecting rewards, moving forward on the map.</li> </ul>	<ul style="list-style-type: none"> <li>Lead your character through the map of fictionland, achieve daily goals and follow as the story unfolds.</li> </ul>	<ul style="list-style-type: none"> <li>Videos to introduce challenges</li> <li>Amimated videos+ voiceover to present the main story</li> <li>Background music</li> </ul>	<ul style="list-style-type: none"> <li>Suitable for all ages</li> <li>Body movement for a healthier mental and physical outlook</li> </ul>										

# Game Design Sheet Template

<b>PURPOSE</b>				
<b>AIM</b>		<b>IMPACT</b>		
<b>CONTENT &amp; INFORMATION</b>	<b>GAME MECHANICS</b>	<b>FICTION &amp; NARRATIVE</b>	<b>AESTHETICS &amp; GRAPHICS</b>	<b>FRAMING</b>

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