

## How can I engage through games and play?

### Creating games that educate and entertain

*Before you read: Have you considered if games are the best way to achieve what you need to? You might be interested in reading our planning guide. This will help you identify your aims and a suitable format.*

### 1 | Why engage through games and play?

While play is often thought of as something that children do in order to learn, it can work just as well with adults. There is increasing evidence that play may be a more effective educational medium than some traditional methods based on the following characteristics:

- **Self-directed** – Play is self-directed which means the learner is an active participant and is much more engaged in the task.
- **Interactive** – As play is interactive, the learner receives much more feedback than in some other formats. Each time there is feedback it is an opportunity to learn.
- **Motivational** – Grasping new concepts requires effort, particularly if they are difficult. Games can provide motivation to overcome this barrier as the learner desires to ‘win’.
- **Dosing** – During play, information is released slowly (or dosed), as and when it is needed to be applied to an upcoming task. This makes processing it much more manageable.
- **Application** – In a game, new information is immediately applied to a task, signalling to the brain the information is useful and should be retained.
- **Multi-sensory** – Research has shown we learn better when multiple senses are employed. Often games are multi-sensory, involving visual, audial and physical components.
- **Pleasurable** – During a game, when a challenge is overcome, this releases endorphins in the player’s brain. Therefore learning through play becomes a pleasurable experience.

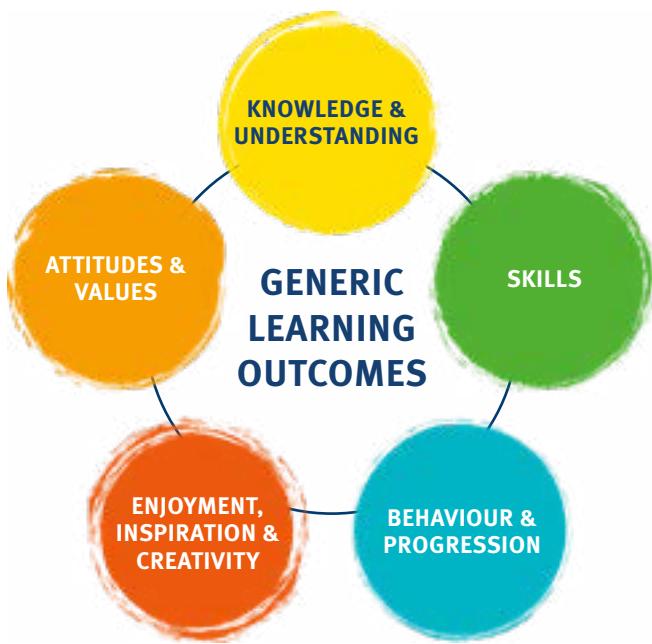
- **Perspective** – Some games involve role-play where we step into others’ shoes. This allows us to explore that person’s perspective and understand their challenges and motivations.
- **Social** – Games can be social allowing us to develop communication skills, as well as building cultural meaning around the learned concepts.

#### Games and resilience

*Traditional assessment can send a message that failure is something negative and static (once a grade is given, it's permanent). This embeds a fear of failure that can be immobilising, preventing us from attempting complex problems. Games, on the other hand, require players to fail as part of the process (a game that is easy to complete is boring). Failure is only temporary and the player is encouraged to try again with a new strategy. This builds resilience and allows us to be more confident when approaching difficult problems. Building resilience is extremely important, particularly in STEM where things don't always go to plan.*

## 2 | What are your game outcomes?

The generic learning outcomes are widely used in museums and science centres when developing activities and exhibitions. Games can target a wide range of learning outcomes and therefore thinking about which ones matter to you is a good start. As games are built on a foundation of ‘play’, they already meet one of the GLOs: **Enjoyment, inspiration and creativity**. Below are some other outcomes you might achieve through different means.



### Knowledge and understanding

In a simplistic game, players are offered scenarios they must react to, either by performing some basic interaction (e.g. rolling a dice) or making a selection. Immediate feedback is given on how they have progressed and players can accumulate some basic knowledge about a science topic.

Example: Players are shown different kinds of cell types and must select the correct organ they belong to.

Simulation is another game format that enables players to learn about a scientific concept by becoming part of the scientific phenomenon itself. This is known as embodied learning.

Example: Give players the roles of particles in a chemical reaction, as well as rules to how they can behave (e.g. other particles they can ‘bond’ with, or pairs they can break apart). As players simulate the behaviour of the particles, they should be able to demonstrate the outcome of the reaction.

### Skills

Skills-based games require players to learn a specific skill that they need to repeat. Each time they must repeat it the problems can grow more difficult. Example: Players must perform scientific procedures in order to succeed. For instance, they must build a new city but need to perform basic geometry to work out what buildings will fit in which spaces.

### Behaviour and progression

Try developing a game that is built around a story. As the player progresses through the game they discover more of the plot. Scientific content can be embedded into the story, allowing more complex knowledge to be acquired and put into a cultural context. If the story has a key message or emotive aspect, this might change attitudes, values or behaviour.

Example: The story might involve us needing to leave Earth as we’ve run out of resources. Through the story, the players explore new planets to find one that is habitable. This allows players to learn more about space, chemistry and physics but this also has a strong message about the importance of sustainability on our planet.

### Attitudes and values

Games designed to achieve this outcome often use role play where players take on the roles of different characters. This allows them to move beyond the scientific concepts and explore how a scientist or other stakeholder might think. It is important that players have control over decision-making and that there are consequences to choices.

Example: Players take the roles of scientists and must approach problems as a scientist would. Objectives of the game could be to make decisions about what are good or bad experimental methods and how to hypothesise or interpret results.

### Combinations

*Don't forget that you can combine the methods above to hit multiple learning outcomes. For example, the game 'Labster' is a simulation where players can practise scientific experiments in a virtual world, allowing them to develop skills and an understanding of lab techniques. At the same time, there is a narrative that covers more detailed knowledge and a role-play element, that allows players to make decisions on behalf of their character.*

## 3 | Designing your game

Once you are clear on your outcomes, you can start designing your game. Games are as variable as our own imagination, so there are no strict rules. However below are some common components that might prompt you:

**Platform:** Are you constructing your game digitally, physically or in the imaginations of your players?

**Play style:** Do you play as an individual or in teams? Is it competitive or cooperative?

**Feedback:** What feedback will be given to tell players about their progress? For example, what rewards or losses will they receive when they've made positive or negative progress?

**Motivators:** What is motivating your player to keep playing? It could be to reach new levels, gain points, acquire useable tools or unlock new areas/parts of the storyline.

**Avatar:** Do you play as yourself, a set character, or an editable character?

**Level of interaction:** Is the players' level of interaction basic (rolling a dice), medium (making choices) or intricate (building choices that have consequences)?

**Challenge type:** What type of challenge do they face? Perhaps it's physical, memory-based, strategic or skills-based.

**Dosing:** How will you dose your information? Will it be offered up-front or will you gradually release it through the game? Do you supply it freely or does the player have to seek it out?

**Access:** How will people access your game? Will it be online? If it's a physical game, will it slot into an existing event like a festival? Or will you organise your own event?

### No need to reinvent the wheel

*You don't need to be a game designer to come up with a great game-based engagement activity. Why not base your game on an existing one? From Snakes and Ladders to Jenga, lots of games can be adapted to meet your engagement goals.*



## Case study: Dicing with Death

### What is it?

*'Dicing with Death' was a drop-in Snakes and Ladders adaptation at an Imperial Lates event. It highlighted the consequences of antibiotic misuse.*

### Why is it a good example?

*This activity was based on a game that was already known to participants making it ideal as a drop-in activity. It aimed to deliver on multiple learning outcomes including increasing knowledge and understanding and influencing behaviour change, all whilst being enjoyable.*

## Case study: Policy Pile-up

### What is it?

*'Policy Pile-up' was a game developed by the Grantham Institute. Participants worked in teams to decide on a selection of transport policies that they would implement for a greener London if they were policy-makers, balancing the science, feasibility, cost and public acceptance.*



### Why is it a good example?

*This game focussed on generating rich dialogue around key issues related to green transport policy by using role play. As well as being highly sociable, it met multiple learning outcomes by shaping attitudes and values and increasing knowledge and understanding.*

## 4 | How can you put this into practice?

Now you have some ideas, you can start thinking about the practicalities of your project. Some key areas to consider are:

### Resources

What do you need to create your game, whether they be physical or digital resources? Can you create them yourself or will you need to purchase these? If your project will require some financial input, see our [webpage on funding engagement activities](#).

### Collaborators

Do you have all the skills required to implement the project? Do you have access to your chosen audience? If not you could consider collaborating with people who can help you with this. See our resource on how to recruit people to your project.

### Evaluation

Can you do some research into your audience, or your idea and see if it's suitable? Once you have a prototype game can you get it play-tested? Then how will you determine if the game is hitting the learning outcomes you targeted. See our resource on evaluation to help you.

## Related links and resources - Let us know of others!

- [This TED talk](#) discusses how the simulation game ‘Labster’ is revolutionising tertiary science education.
- [In this article](#) game designers reveal their top tips for creating a game that’s fun and meaningful.
- [This article](#) describes the four P’s (Purpose, Process, Practicality and Playability) that help ensure your game has impact.