

Design-a-game

This lesson should be carried out prior to visiting the 'Move over Einstein: the next generation is here!' exhibition. There are 3 activities in total:

- the pre-visit lesson
- visit information and
- the post-visit lesson.

Aim

To design a board game that conveys one of the themes of the exhibition in a fun way!

Objectives

- Students will have an understanding of the design process
- Students will understand that their design brief is to make a board game to convey an area of modern research
- Students will understand that they must use a theme from the 'Move over Einstein: the next generation is here!' exhibition for their game.

Curriculum links

Design and technology, Science, PSHE and IT

Resources required

Paper and pens

Teaching activities

Introduction

In this lesson the students should be introduced to the concepts of the design process. The design process is followed by designers, engineers and inventors and takes them, step-by-step, through solving a problem. Discuss the following points of the process with the students.

- 1 The problem.** The process of a design begins where there is a need or when an improvement of an existing product is required.
- 2 The design brief.** The design brief must be very simple and clear. It must state what is to be designed.
- 3 Investigation.** In this step the designer must understand what information is needed to realize the design. This information must then be collected. Questions to be asked might include, what is the function? What should the appearance be? What materials are available or required?
- 4 Developing solutions.** In this step ideas should be discussed and recorded. All ideas should be written down and the students should not be critical of each other! The more ideas there are, the easier it will be to come up with a solution. In this step the students should try to be imaginative in their ideas.
- 5 Choosing a solution.** The ideas should be studied and the one that best meets the design brief chosen as the solution. This solution will also need to meet any restrictions in time, costs or materials available.

- 6 Models and prototypes.** In this step a model (full-sized or scaled down) is built to understand and communicate the idea. A prototype is a working version of the solution which can then be tested to make sure it works.
- 7 Testing and evaluation.** During this phase the prototype is tested to make sure it works and that it meets the design brief. This phase will also allow the designer to see if any modifications are needed to improve the solution.
- 8 Manufacturing.** Once everyone is happy with the design and knows that the product will sell, it must be manufactured. Depending on the product it might be mass produced or it might be a specially constructed product that is hand-made.

Our **problem** is:

Some people do not have a clear understanding of any exciting areas in modern physics.

The **design brief** is:

Design a board game to be played by 11-13 year olds which highlights an area of modern physics from the 'Move over Einstein: the next generation is here!' exhibition.

Activities

The students should be split into small groups to form 'companies'. Each group should give their company a name and start to discuss the problem and the design brief. They should start the 'Investigation' phase of the design process. It may help to think about the following items which are particular to game design.

Player interaction

When playing the game are there consequences of certain actions that affect the other players in the game too? For example, will items be traded during the game?

Decision making

Will the game be dependant on luck (eg roll of the dice as in snakes and ladders) or will it be dependant on decisions made by the players (eg assessing the players' situation before making a decision)?

Pace of the game

A good game moves along at a fairly quick pace. Players have more fun in games if their turn comes round frequently!

Rules

Every game must have rules set out that define the way the game is played, who wins and any activities within the game.

They should consider different game styles and list games they like and dislike to help them think about what makes a good game.

Each company must remember that eventually they need to decide on:

- format
- number of players
- who goes first
- length of game
- objective of game/who wins
- rules of the game
- whether questions will be involved in the game
- equipment needed.

Plenary

Find out what questions the different groups asked during the 'Investigation' phase and will seek to answer at the visit to the 'Move over Einstein: the next generation is here!' exhibition.

Suggested homework

Complete the 'Investigation' part of the design process. That is, write up what you will need to learn from the visit to the exhibition to allow the game to be designed.

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Objectives

During the visit to the exhibition, each group of students or company must decide which topic they wish to use as the theme for their game.

Introduction

The exhibition contains exhibits on the following topics:

- the Higgs particle
- Dark Matter
- the search for planets
- nanotechnology
- quantum cryptography
- smell machine for detecting diseases.

Suggested activities

During their time at the exhibition students must thoroughly research the content of each area. They should decide what they want the theme of their game to be and make notes from the exhibition.

In their groups they should complete the '**developing solutions**' part of the design process and record all their ideas for games. The students should look back to notes they made in the previous lesson regarding game styles that they like and styles they don't.

They should then choose the best idea and sketch their chosen game. This is the '**choosing a solution**' step of the design process.

Suggested homework

The students should design their board game on card or paper, or using a computer programme such as PowerPoint.

The students should also make a list of materials needed to build a prototype of the game in preparation for the next lesson.

Design-a-game

Objectives

- Students will build a prototype of their game
- The game will be tested and evaluated by students outside of the design team.

Curriculum links

Design and technology, Science, PHSE and IT

Resources required

Resources required for this lesson are those needed to build the proto-type of the game.
Suggestions:

- Card
- Glue
- Scissors
- Dice
- Plastic pieces, corks, bottle tops
- Fymo
- Sellotape
- Pens
- Computer and printer access

Teaching activities

Introduction

Review the **design process**.

Review the stages the students have completed (the problem, the design brief, investigation, developing solutions, choosing a solution).

During this lesson the students will complete the '**model and prototype**' and '**testing and evaluation**' stages of the design process.

They should build a prototype of their game. The students should first play the game in their group to test it and then their friends should play the game. The friends could evaluate the games and give them marks if desired.

Each game should also be given a name.

Activities

Build the game!

Plenary

The results of the evaluation should be revealed and a review should be made about which games were successful and the most fun. Was there a particular style or method that worked well?

Suggested homework

The last phase of the design process is the '**manufacturing stage**'. Students should consider this stage and write it up along with a design for the box of the game, or an advert to sell the game once it has been manufactured.

All engineers, designers and inventors follow a simple 8-step process when designing; this is called the **design process**. Following this process will help you design your game.

The design process

- 1 **The problem.** The process of a design begins where there is a need or when an improvement of an existing product is required.
- 2 **The design brief.** This states what is to be designed. The design brief must be very simple and clear.
- 3 **Investigation.** In this step the designer must understand what information is needed to realize the design. This information must then be collected. Questions to be asked might include, what is the function? What should the appearance be? What materials are available or required?
- 4 **Developing solutions.** In this step ideas should be discussed and recorded. All ideas should be written down and kept, do not be critical of each other! The more ideas there are, the easier it will be to come up with a solution. In this step the students should try to be imaginative in their ideas.
- 5 **Choosing a solution.** The ideas should be studied and the one that best meets the design brief should be chosen as the solution. This solution will also need to meet any restrictions in time, costs or materials available.
- 6 **Models and prototypes.** In this step a model (full-sized or scaled down) is built to understand and communicate the idea. A prototype is a working version of the solution which can then be tested to make sure it works.
- 7 **Testing and evaluation.** During this phase the prototype is tested to make sure it works and that it meets the design brief. This phase will also allow the designer to see if any modifications are needed to improve the solution.
- 8 **Manufacturing.** Once everyone is happy with the design and knows that the product will sell, it must be manufactured. Depending on the product it might be mass produced or it might be a specially constructed product that is hand-made.

When choosing which idea will become your solution keep in mind some things related to games that might be important:

- **Player interaction.** When playing the game are there consequences of certain actions that affect the other players in the game too? For example, will items be traded during the game?
- **Decision making.** Will the game be dependant on luck (eg roll of the dice as in snakes and ladders) or will it be dependant on decisions made by the players (eg assessing the players' situation before making a decision)?
- **Pace of the game.** A good game moves along at a fairly quick pace. Players have more fun in games if their turn comes round frequently!
- **Rules.** Every game must have rules set out that define the way the game is played, who wins and any activities within the game.



*Move over Einstein:
the next generation is here!*

the design brief

The design brief

Design a board game to be played by 11-13 year olds which highlights an area of modern physics from the 'Move over Einstein: the next generation is here!' exhibition.

Record your decisions below:

Format	
Number of players	
Who goes first	
Length of game	
Objective of game/who wins	
Rules of the game	
Does the game involve questions?	
Equipment needed	

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Version 2.0 18th February 2005
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