

# CLIMATE CHANGE ALL CHANGE

## Design Literacy topics and resources Teacher's Notes

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These learning resources are for teachers to use flexibly with their classes.

There are five PowerPoint/ Workbook presentations, with interactive elements such as 'click and reveal' to prompt class discussions.

Each presentation ends with a short quiz. Each presentation starts with a question.

The following sections outline the learning aims of each presentation for children, additional information for teachers, suggested classroom activities, and additional resources for teaching and learning.

This Design Literacy Resource is intended to supplement Design and Technology and may also cover topics in the curriculum subjects of Geography, Science, Maths, Art and Design, and Computing. It is a companion to the CCAC Climate Change Literacy Resource.

# Design Literacy Introduction

## Learning outcomes

- Identify starting points for design professional knowledge, activities, and understanding.
- Develop curiosity about what designers do, how they do it, and what they can achieve.
- Identify how their skills can be effectively used to mitigate the effects of climate change.

## Additional Information

The CCAC Design Literacy Resource is a companion the CCAC Climate Literacy resource and is intended to provide background for the CCAC Co-design climate change programme. However, it can also be used alongside Design and Technology based Curriculum learning derivatives or as a stand-alone introduction to the subject of design.

Definition of the design professions as described in the Resource – it includes architects and engineers, but not artists, crafts people, scientists, or technicians.

Homework suggestions have not been included although they could be inferred from additional activities.

The content of the Resource derives from CCAC's experience of working with Year 5 (9 to 10-year-olds) in state primary schools.

## Possible activities

Introduce the topic with a whole class discussion and scribing of children's ideas; or have children work in pairs or small groups to discuss and report back. What do children think designers do? How do they get their ideas across and where do they source them? How do designers influence change? What do we want to find out about the world of design?

# Lesson 1 What is Design?

## Learning outcomes

- Understand what design is
- Understand who designers are and what fields they cover
- Understand how one might become a designer
- Understand the range and scope of design

## Additional information:

Design is essentially problem solving; to envisage, plan and ideally improve the physical or virtual elements of our lives.

Design is not about 'making things look good'. Unlike artists, designers rarely value individual expression and the designer's outcome is not a unique, rarefied object for contemplation but a useful one that allows someone to effectively do something. (Aesthetics is not the sole focus.)

Design is the planning, creation, or invention of something that is not just new, but better than what currently exists. Design combines reflection on the present situation and projection into the future, with the aim of making it better (more efficient, easier to use, less expensive etc).

Whilst design is about making the future better, there are some inventions that improve some people's lives but make others' worse. Design does not always result in making the world a better place. So, it is important to think about what impact our designs will have.

When we think of design, we often think of established disciplines such as graphic design, architecture, or fashion. But these categories don't do justice to the breadth and diversity of design. A century ago, the role of the designer may have been to design a car, a chair, a building, or a logo, but today it spans areas as diverse as space exploration, healthcare, cybernetics, and software.

In essence, design is a process of thinking that can be applied at any scale. It should be stressed that designing something is rarely done by one person but relies on building upon existing models and developing ideas in collaboration with others. A design will be improved through experimentation and modification. (E.g. The first design of the bicycle by Drais was not the final bike we have today. Nor was the Waffle shoe that William Bowerman designed. Today's bikes and trainers have been developed over and over by many different designers who are each trying to improve the product.)

## Quotes about design:

*"The designer's job is to imagine the world not how it is, but how it should be."* – Sir Terrance Conran

*"In order to fix something, you need a passionate anger about something that doesn't work well."* – James Dyson

*"Everything is designed. Few things are designed well."* – Brian Reed (front-end developer and musician)

*"Design is not just about what it looks like and feels like. Design is how it works"* – Steve Jobs, Co-founder of Apple, Inc.

There are 6 classroom questions included in this Lesson. See Student Activity PPT

## Other Possible activities

1. Name the Logo: Display some logos from products in our everyday lives and ask students to try and guess the company/brand. Once the brand has been revealed then give some

explanation on the design of the product. (Example: Nike, Starbucks, Dominos, Apple). Intention of the activity is to emphasise how all products have been 'designed' and require lots of different design fields such as graphic design, packaging design etc.

2. Ask the children to research the work of a designer or organisation who interests them. Identify a favourite designed product and set out an analysis of the product. An A3 poster should include:

- Quotes
- Photos stuck in/or drawings and diagrams of the product
- Explanation of its purpose/what might have inspired the design?
- Explanation of how this design has been developed in later years

#### Additional resources

- <https://designmuseum.org/>
- <https://www.architecturaldigest.com/story/designs-that-shape-our-world>
- <https://edition.cnn.com/interactive/style/20-designs-that-defined-the-modern-world/>
- <https://medium.com/@GetScriba/19-most-famous-examples-of-influential-product-design-3dd7f0ef657a>

## Lesson 2 What makes a Good Designer

### Learning outcomes

- Understand the attributes and skills of a designer
- Understand the opportunities and constraints that designers need to draw on to find inspiration and execute effective design
- Understand that design as a practice, crosses disciplines. It requires problem solving skills, technical skills and artistic skills to communicate the idea clearly and persuasively.

### Additional information:

Designers are part of an important trifecta – designer, maker, user.

- Designer: The person or team who create and develop the concept
- Maker: The person or company that realises the design concept in physical form ready for use
- User: The person or people for whom the design is intended and who will benefit from it

Education Departments have had difficulty categorising the study of design for teaching and learning within schools. The primary school Curriculum combines it with Technology, as a GCSE, AS and A level subject it is combined with Art. These pairings cause considerable confusion and complicate an already very wide spectrum of study. While designers draw on technology and science and often promote or rely on it, and while they can be inspired by the arts, the study of design should be considered an autonomous, multifaceted subject.

Designers cover everything from a means of attaching sheets of paper together – the staple or paperclip – to a means of propelling astronauts into space or a crew into the depths of the ocean.

A common misconception is that designers simply make things look good. Aesthetics represents only a small fraction of design practice. Whilst designers share an understanding of basic aesthetic principles such as balance, form, colour, scale, designers and artists use these differently. Unlike a piece of art, which is a unique result of someone's individual expression, designers create things that allow someone to do something with that object. Design also shares similarities with craft, particularly attention to the technical aspects of making things. But craftsman usually make things by hand and on small scale, whereas designed objects are generally mass produced. A designed object, say a car or building, is often a combination of a multitude of subsidiary objects designed by a multitude of contributors. Whereas craftsman begin with an intimate knowledge of materials or forms, designers begin with clients or users and their needs.

Another misconception is that design is the same as branding and advertising. However, whilst branding and advertising will need graphic designers, they are different because branding and advertising is about creating something that will influence someone to buy or do something. Design is concerned with how the product can make a person's life easier and improve their quality of life.

There are 2 classroom questions included in this Lesson

### Possible activities:

1. Suggest three designed objects of increasing complexity, e.g. a timber framed arm chair, a laptop, and a double decker bus. Ask them to think about the various design skills and

technologies involved in making the final product. E.g. woodwork, upholstery, electronics, graphic design, battery technology, IT, cybernetics, electricity propulsion, space planning aerodynamics, etc,

2. Put the students in pairs to complete this exercise. It should take 5-10 minutes. Students are asked if they can think of some designed objects or assemblies that make our lives better. They should do the first part independently then have a quick discussion with their partner(s) to explain their object, what it is made from, what is its function and why does it make our lives better?
3. Designing Road Signs: *Task is a bit lengthy but feel free to alter in any way you see fit. Intention of exercise is to start thinking about how design impacts every part of our lives.* Road signs are a major part of our city safety and navigation, and good design clarifies direction and eases navigation. The design of road signs needs to be inclusive as they speak a universal language for users. *Ask students to create a family of road signs for a person coming to their home for the first time. The person may not speak English. Students need to work out:*
  - What you need to sign post their homes?
  - What will they need to find it easily?
  - What would be the most important item for finding you?
  - What colour combination should their signs be?

#### Additional resources

- <https://designmuseum.org/discover-design/all-stories/british-road-signs>
- <https://www.perlego.com/book/1176335/design-the-key-concepts-pdf>

## Lesson 3 The Design Process

### Learning outcomes

- Understand the sequential process that designers take from concept to completion.

### Additional information:

One of the fundamental elements we must think about before considering the 'design process' is that it is carried out by people, for people. At its heart is a dialogue between three key parties: the designer, the maker and the user. Designers are designing and responding to the needs of makers and users, how users influence and enjoy the design.

The 6 steps set out here are pretty standard for all design disciplines.

1. Define the problem
2. Collect information
3. Brainstorm and analyse
4. Develop solutions
5. Gather feedback
6. Improve

They apply equally to designing a relatively simple item such as a vending kiosk and to more complex bespoke ones, eg modes of transport, buildings, and computer games. However, designers in certain fields often find they are asked to make improvements on an existing, classic design that will give the company an advantage over their competitors, say a bicycle that is not only light and can be folded for ease of carrying, but also glows in the dark. In these cases, the initial steps of definition and problem solving will be much more prescriptive.

### Possible activities:

1. Can you build a bridge span that holds 5 grams using 1 A3 sheet of paper? The bridge must support its own weight (the dead load) as well as the weight of anything placed on it (the live load). Your paper bridge must span 20 centimetres. The sides of your bridge will rest on two books and may not be taped or attached to the books or the table. Live load must be placed at the centre of the span.

Materials: plain paper, ruler, 2 books or blocks, the live load comprising coins or other small weights

The winning bridge supports the largest load without collapsing.

2. Prompt the class to think of a product that they use on a day-to-day basis, but has explicit shortcomings, something that annoys them and which they would like to solve. Gather the substandard suggestions and split the class into groups each addressing one of the items. Analyse and seek to improve the design using a worksheet that sets out the Design Process Steps.

### Additional resources:

- <https://discoverdesign.org/handbook>
- <https://www.schoolsofkingedwardvi.co.uk/ks2-design-design-criteria-1-design-cycle/#:~:text=The%20stages%20are%20Investigate%2C%20Design%2C%20Plan%2C%20Create%20and%20Evaluate.>
- <https://www.youtube.com/watch?v=W-eqjMc1Efs>
- <https://youtu.be/dZKFrObnNlo>

## Lesson 4 From Concept to Fabrication

### Learning outcomes

- Understand how designers convey a design idea to practical development
- Understand how a concept can be developed for manufacture, fabrication, and construction
- Understand what tools are available to assist in this

### Additional information

This lesson takes the development of a design from concept to manufacture. We quickly get into the realm of computer aided design and increasingly sophisticated elaborations of computer programmes. This goes hand in hand with the increasing precision required for manufacture, assembly, and construction. Key to this is the conversion of a sketch into a scaled proposition.

Design ideas are typically a result of identifying a problem and coming up with a suitable and efficient solution. Once the idea has been conceptualised, tested, and approved; detailed design is required for realisation.

Designers use a range of tools to allow them to develop and relay their intentions. They have at their disposal an array of digital tools such as AutoCAD, Rhino3D, Adobe Photoshop, Adobe InDesign etc. This software considerably speeds up the process with much greater accuracy than the hand generated information of 30 years ago.

In the 1980s and 1990s, the introduction of computer-aided design (CAD) software fundamentally changed industrial and product design. CAD enabled designers to visualise new products with great precision and to modify, refine, and edit their designs on screen. Accurate and flexible, as well as mapping a 3D product, CAD software could store additional data, such as material variations or tolerances. The gradual replacement of manual drafting and documentation redefined how designers envisaged three-dimensional things.

Combined with CAD, computer aided manufacturing created a powerful means to produce things. To automate manufacturing, CAD models are sent directly to computer driven machines and robots. While automotive and electronics manufacturers were amongst the first to use industrial robots as early as the 1960s, most mass-produced things today result from automated manufacture.

3D printing, may counter this trend. Rather than casting, moulding, or turning, 3D printing is an additive process, laying down the layers of a material to form a solid object. Initially used in the aerospace and automotive industries to create specialised parts, it was soon adapted to medical, fashion, and product applications. At first, only plastics and metals were printed but now 3D printers can use a range of materials including biomaterials. In the last decade, the gradual reduction in price of desktop 3D printers has made rapid prototyping affordable, and facilitated the design and production of customised things, at least on a small scale.

### Possible activities:

1. Find an old piece of kit that is assembled from several parts such as an old floor-standing speaker. Disassemble it photographing each stage of disassembly. Take the collection of parts to the class and show them the photos of the various stages of disassembly. Ask them where they think the materials come from and what skills are needed to transform them ready for assembly. Ask the children how they think each part is made.



2. Ask the class to describe the processes they think are involved in developing a particular product, from conception to point of sale. Ask why they think this item was designed in the first place, what problems does it solve, how did they develop the idea into a final product, etc. (Example: Raincoats were developed to stop the wearer getting wet when in the rain. What natural materials were originally used to shed the rain without penetrating the coat? How were they configured? What contemporary materials are used and what is their advantage over the original natural solutions? Are there disadvantages to the modern solutions? Are they eco-friendly? Can they be recycled when worn out?)

More elaborate ready-made activities:

3. Make-Able: <https://classroom.weareprintlab.com/p/make-able>
4. V&A lesson plan on Solving a problem by innovation and making (Student Workbook): <https://vanda-production-assets.s3.amazonaws.com/2022/08/24/13/33/47/434b50ca-b9db-4cdd-90ac-1a51bd256770/V&A%20Innovate%20Student%20Toolkit.pdf>

Additional resources

- <https://opentextbc.ca/graphicdesign/chapter/2-5-concept-development/>
- <https://maestrolearning.com/blogs/learning-design-tools/>
- <https://www.youtube.com/watch?v=Vx0Z6LplaMU&themeRefresh=1>
- <https://www.youtube.com/watch?v=igKq9ORkcHc>
- <https://www.perlego.com/book/1176335/design-the-key-concepts-pdf - chapter 2>
- <https://classroom.weareprintlab.com/p/3d-printing-guide-for-teachers>
- <https://youtu.be/dZKFrObnNlo>

## Lesson 5 Design as an Agent of Change

### Learning outcomes

- Understand how designers identify shifts in social and environmental conditions
- Understand how design can anticipate and make these changes
- Understand how designers need to be innovative and ahead of the game
- Understand the designer's role in mitigating the effects of climate change.

### Additional information

Design is intended to make improvements, but it can inadvertently create problems. Much design is needed to rectify the consequences of previous design. One of the reasons we are experiencing the climate crisis is because many items have turned out to be insufficiently farsighted and, in many cases, detrimental to the wellbeing of both the natural and man-made environments. It is now clear that insufficient design consideration has been given to a range of environmental impacts. They include the use of scarce resources, the impact on the natural environment, the amount of fossil fuel energy used in making and transporting goods for processing and manufacture, pollution arising from making and using the designed products, the ability to recycle or biodegrade effectively, particulate, aural and visual pollution, etc.

When we buy plastic items that are only used once (or for a few months), like a plastic bottle or a plastic handled toothbrush, we are polluting the planet and local environment as they are not biodegradable. So, when we no longer want these items they are disposed of, often end up in landfill sites or the sea, and become someone else's problem.

Designers are now mostly aware of these problems. Tommy from Bambuu Brush has created some simple but very useful designs that can help us be more mindful for our earth. He designed toothbrushes that were made from biodegradable bamboo instead of plastic. Tommy and his wife also created the one swap plastic initiative, which asks us if we can swap our plastic materials to bamboo materials, such as bamboo cutlery.

Designers, being infinitely innovative, are overcoming these issues, but do they have the foresight to see the next human upheaval: mass migration and its design consequences?

### Possible activities

1. Use the cans to construct 'Recycled Can Bird feeder': <https://www.momtastic.com/family/diy-for-kids/518739-recycled-can-bird-feeder/#/slide/1>
2. Use Old magazines to makes bowls: <https://livingonthecheap.com/turn-old-magazines-into-beautiful-bowls/>
3. Use old T-Shirts to make a no-sew tote bag: <https://mommypotamus.com/no-sew-t-shirt-tote-bag-tutorial/?crlt.pid=camp.qz75bkL6fsil>
4. Split the class into groups of 3-4 children. Show each team an object – e.g. laptop, mobile, wind turbine, submarine, bus, a suspension bridge, a football stadium, etc. and allow them 5 minutes to brainstorm as a group how it influenced the design world and related professional disciplines – science, technology, human sciences, ecology, economics, art?
5. Students workbook includes a few images of designs that have been part of our everyday life. This brief exercise seeks to show them how some things could be improved. E.g. sinks and wash hand basins, unlike showers in the UK tend to have one

hot tap and one cold tap which results in the user either having boiling water or freezing water. The simple solution would be to have sinks designed with one tap that mixes the water. Briefly discuss these images in class.

#### Additional resources

Bambuu Brush production video:

- <https://youtu.be/-Y-BRKC62pc>

More information on the benefits of eco-friendly bamboo brushes:

- <https://ecoluxeproduct.com/plastic-dental-products-climate-change/>

Design museum exhibition for 'The Waste Age'

- <https://vimeo.com/622445106>
- <https://play.acast.com/s/the-design-museum-podcast/the-waste-age>

Some examples of designers making stuff from waste:

The Evolve Chair is made from recycled laptops - <https://www.dezeen.com/2021/01/10/tom-robinson-evolve-chair-recycled-plastic-discarded-laptops/>

Sonnett155 designs a 'temporary handbag' made from recycled food peels - [https://www.dezeen.com/2021/04/27/sonnet155-lobke-beckfeld-johanna-hehemeyer-curten/?li\\_source=LI&li\\_medium=rhs\\_block\\_1](https://www.dezeen.com/2021/04/27/sonnet155-lobke-beckfeld-johanna-hehemeyer-curten/?li_source=LI&li_medium=rhs_block_1)

Notpla Salvages seaweed to make sustainable paper packaging - [https://www.dezeen.com/2022/03/01/notpla-paper-recycled-leftover-seaweed/?li\\_source=LI&li\\_medium=rhs\\_block\\_1](https://www.dezeen.com/2022/03/01/notpla-paper-recycled-leftover-seaweed/?li_source=LI&li_medium=rhs_block_1)

Students turn used chewing gum into skateboard wheels - [https://www.dezeen.com/2021/04/20/gum-skateboard-wheels-hugo-maupetit-vivian-fischer/?li\\_source=LI&li\\_medium=rhs\\_block\\_3](https://www.dezeen.com/2021/04/20/gum-skateboard-wheels-hugo-maupetit-vivian-fischer/?li_source=LI&li_medium=rhs_block_3)

#### Complimentary resources

Websites:

- Design Observer - <https://designobserver.com/>
- Core 77 - <https://www.core77.com/>
- Dezeen - <https://www.dezeen.com/>

Podcasts:

- Debbie Millan's Design Matters - <https://www.designmattersmedia.com/>
- 99% Invisible - <https://99percentinvisible.org/>
- The Design of Business - <https://podcasts.apple.com/gb/podcast/the-design-of-business-the-business-of-design/id1165804333>

Introductions into Design:

- John Heskett, *Design: A very Short Introduction*  
[https://books.google.co.uk/books/about/Design\\_A\\_Very\\_Short\\_Introduction.html?id=5hxqRkf4znkC&redir\\_esc=y](https://books.google.co.uk/books/about/Design_A_Very_Short_Introduction.html?id=5hxqRkf4znkC&redir_esc=y)

- Mike Press and Rachel Cooper, *The Design Experience: The Role of Design and Designers in the 21<sup>st</sup> Century*, 2003.  
<https://www.amazon.co.uk/Design-Experience-Designers-Twenty-First-Century/dp/0566078910>
- Donald A. Norman, *The Design of Everyday Things, Revised* 2013:  
[https://www.amazon.co.uk/Design-Everyday-Things-MIT-Press/dp/0262525674/ref=pd\\_lpo\\_2?pd\\_rd\\_w=0RHLb&content-id=amzn1.sym.2d229339-2f42-4596-a90d-b81a4f52d6d3&pf\\_rd\\_p=2d229339-2f42-4596-a90d-b81a4f52d6d3&pf\\_rd\\_r=S7X4YMJQ3RB72AN9EP41&pd\\_rd\\_wg=Txe4z&pd\\_rd\\_r=ec3f5962-2a58-43e3-b972-7415997f9256&pd\\_rd\\_i=0262525674&psc=1](https://www.amazon.co.uk/Design-Everyday-Things-MIT-Press/dp/0262525674/ref=pd_lpo_2?pd_rd_w=0RHLb&content-id=amzn1.sym.2d229339-2f42-4596-a90d-b81a4f52d6d3&pf_rd_p=2d229339-2f42-4596-a90d-b81a4f52d6d3&pf_rd_r=S7X4YMJQ3RB72AN9EP41&pd_rd_wg=Txe4z&pd_rd_r=ec3f5962-2a58-43e3-b972-7415997f9256&pd_rd_i=0262525674&psc=1)