Sample teaching planner –
Materials and technologies specialisations

Design and Technologies

Levels 7–10

**Disclaimer:** It is the responsibility of the school to ensure that duty of care is exercised in relation to the health and safety of all students undertaking any activities suggested in this teaching planner.

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Level 7, 2 Lonsdale Street
Melbourne VIC 3000

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Introduction

Materials and technologies specialisations explores the design process and materials, systems, components, tools, equipment and techniques used to make products for end users. Students consider environmental, social and ethical issues related to design and come to understand the importance of safety when working with materials and technologies.

This teaching planner identifies themes, key messages and ideas for teaching content from specific content descriptions of Materials and technologies specialisations Levels 7 to 10. The information in the teaching planner has been provided to assist teachers to design and plan teaching and learning programs that are suitable for their students. The ideas for teaching curriculum content are not intended to comprise a sequence of learning but rather they are ideas to support teachers to plan suitable lessons.

Please note, teachers are advised to use their professional judgment to ensure lesson plans comprehensively address the relevant content descriptions.

Online resources for Materials and technologies specialisations

To complement the sample teaching planner, a suite of online resources has been curated and published on FUSE’s [Materials and foods specialisations page](https://fuse.education.vic.gov.au/pages/materialstechnologies). The resources are categorised according to the four themes identified in this sample teaching planner and support the teaching of content in the Technologies Contexts sub-strand Materials and technologies specialisations in Victorian Curriculum F–10 Design and Technologies.

Hyperlinks to relevant FUSE resources, plus other online resources, are included within the ‘Ideas for the classroom’ sections in this teaching planner.

Key theme 1: Designing and producing with textiles and fashion products

The ‘Ideas for the classroom’ in this theme promote skills, knowledge and understanding of concepts related to non-resistant materials.

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|  | **Levels 7 and 8** | **Levels 9 and 10** |
| **Key messages** | * Using technologies in the textile and fashion industries enables a greater range of products to be developed.
* Sustainability considerations impact on the design of textiles and fashion products.
 | * Emerging materials in textiles and fashion impact on design decisions.
* Textile and fashion products can be evaluated against criteria for success that consider sustainability.
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| **Ideas for the classroom** | * Research how the development of different technologies enables bamboo fibre to be used for a range of textile and fashion products. Assess the sustainability of these bamboo products.
* Explore the benefits of using wool to make sneakers.
* Source discarded or pre-loved woollen knits and up-cycle into another garment, following the requirements of a design brief.
* Investigate the characteristics and properties of textile materials and their impact on designed solutions in Australia and in Asia, for example the choice of locally grown materials to make household furniture or considering the durability of textile fabrics and fibres and how they can be used.
* Develop criteria for success to evaluate a textile or fashion designed solution such as a sports carry bag. Consider how well the carry bag functions in terms of design, and the sustainability of the materials used to make it. Criteria to evaluate the carry bag might include:
* the suitability of the fabric it is made from
* how well its design holds sports equipment
* how easy it is to carry the bag from its storage area to other areas in the sports venue.
* Research emerging technologies – for example flame-retardant fabrics or smart materials such as self-healing or odour-resistant materials – and their potential impact on design decisions in the textile and fashion industries.
* Test the properties of products to be recycled or up-cycled, for example the malleability and durability of second-hand hats. Determine if the properties of the hats will be suitable for new designed solutions.
* Critique the design of new textiles and fashion products to identify how well they respond to sustainability issues. Refer to [The Ethical Fashion Report](https://baptistworldaid.org.au/resources/2019-ethical-fashion-report/), published annually by Baptist World Aid Australia, for information.
 | * Critique mass-production systems, such as the mass production of clothing and shoes, taking into account ethics and sustainability considerations.
* Analyse emerging materials and how they can impact on textile and fashion design decisions, for example the comfort and practicality of wetsuits that mimic shark skin or 3D-printed shoes.
* Evaluate professions in the textile and fashion industries and their contributions to society locally, nationally, regionally and globally, for example Aboriginal designers collaborating with international craftspeople for local enterprises.
* Develop criteria for success to evaluate designed solutions for the creation of a textile product such as a unisex garment or a jewellery item, in terms of aesthetics, functionality and sustainability.
* Generate design ideas, either free-hand or using 3D modelling software such as SketchUp, to address a problem or opportunity related to designing for a global preferred future. For example, design a bum bag made from sustainable materials that holds items specific to a vocation or purpose. Consider the textile and fashion materials used and their environmental impact. Further [information about SketchUp](https://fuse.education.vic.gov.au/ResourcePackage/ByPin?pin=7BJL84) can be found on FUSE.
* Develop criteria for success to evaluate the bum bag, including how well the bum bag functions in terms of design and the sustainability of the materials used to make it. Criteria for success might include:
* the suitability and sustainability of the fabric it is made from
* how well its design holds the intended items
* how comfortable the bag is to wear.
* Identify the end users, criteria for success, constraints, available resources and timeframe for a design brief for a travel product. Consider the materials used and its environmental impact.
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| **Content descriptions** | * Examine and prioritise competing factors including social, ethical, economic and sustainability considerations in the development of technologies and designed solutions to meet community needs for preferred futures [(VCDSTS043)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS043)
* Analyse ways to create designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment [(VCDSTC048)](https://victoriancurriculum.vcaa.vic.edu.au/technologies/design-and-technologies/curriculum/f-10#level=7-8&search=1d6d88da-6544-471f-893f-7cd5a92b4f95)
* Critique needs or opportunities for designing and investigate, analyse and select from a range of materials, components, tools, equipment and processes to develop design ideas [(VCDSCD049)](https://victoriancurriculum.vcaa.vic.edu.au/technologies/design-and-technologies/curriculum/f-10#level=7-8&search=a91db062-7138-47bf-a24b-66f0ea527804)
* Effectively and safely use a broad range of materials, components, tools, equipment and techniques to produce designed solutions [(VCDSCD051)](https://victoriancurriculum.vcaa.vic.edu.au/technologies/design-and-technologies/curriculum/f-10#level=7-8&search=c66da6f7-72ff-4c7e-af71-65f238e772ce)
 | * Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved [(VCDSTS054)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS054)
* Explain how designed solutions evolve with consideration of preferred futures and the impact of emerging technologies on design decisions [(VCDSTS055)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS055)
* Investigate and make judgements on how the characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions [(VCDSTC059)](https://victoriancurriculum.vcaa.vic.edu.au/technologies/design-and-technologies/curriculum/f-10#level=9-10&search=e6a07fe0-7229-4fba-8db1-a6dd9ca4131e)
* Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to develop design ideas [(VCDSCD060)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD060)
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Key theme 2: Designing and producing with paper, cardboard, plastic, wood and metal

The ‘Ideas for the classroom’ in this theme promote skills, knowledge and understanding of concepts related to resistant materials, paper and cardboard.

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|  | **Levels 7 and 8** | **Levels 9 and 10** |
| **Key messages** | * The characteristics and properties of materials will impact on products made from resistant and paper materials.
* Designing and producing with resistant and paper materials has positive and negative sustainability considerations.
 | * Innovation in technologies and processes impacts on sustainability.
* Life cycle thinking can influence decision making when selecting resistant materials.
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| **Ideas for the classroom** | * Discuss the environmental consequences of materials used in existing products such as disposable plastic cutlery.
* Test the characteristics and properties of materials. For example, test the strength and hardness of acrylic and determine if it would be suitable for a laser-cut jewellery stand. [Examples of material tests](https://fuse.education.vic.gov.au/Resource/ByPin?Pin=D8WTXN&SearchScope=All) can be found on FUSE.
* Design and produce a wellbeing product such as a prayer stool or small meditation table using technology in an innovative way and also considering the product’s environmental, ethical and social impacts. List the tools and equipment needed to make the designed solution and analyse the risk involved for each. Share findings with the class. Demonstrate to students how to use tools, machines and equipment to support safe work practices.
* Develop a project plan to manage processes and coordinate production of a designed solution using recycled timber, according to the requirements of a design brief. Investigate and list the materials that will be used, as well as the tools, equipment and machines, and any potential risks involved when using them.
* Analyse plastic products against a more sustainable design, such as plastic versus paper or metal straws, and annotate the positives and negatives of each.
 | * Students investigate the public seating or street furniture in their school, suburb or community. They generate design options to improve the public seating or street furniture and gather feedback from community members about their ideas.
* Research innovation in construction techniques, such as using cooling systems in bricks, light-generating cement, pollution-absorbing bricks and self-healing concrete, and discuss the benefits of these techniques.
* Research the Forest Stewardship Council (FSC) and identify the different categories of timber certification that it provides.
* Consider factors that influence design and the work of professional designers and technologists, including time and access to skills, knowledge, finance and expertise; for example, consider Australian designers working with rapid prototyping manufacturers in China.
* Examine the relationships of properties in complementary materials in products, for example examine compressive and tensile strengths of materials in jewellery or floorboards.
* Explain how product life cycle thinking can influence decision making, and identify materials in a product that have a lower carbon footprint.
* Critique a range of furniture products and consider their environmental, ethical and social impacts.
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| **Content descriptions** | * Examine and prioritise competing factors including social, ethical, economic and sustainability considerations in the development of technologies and designed solutions to meet community needs for preferred futures [(VCDSTS043)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS043)
* Analyse ways to create designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment [(VCDSTC048)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC048)
* Critique needs or opportunities for designing and investigate, analyse and select from a range of materials, components, tools, equipment and processes to develop design ideas [(VCDSCD049)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD049)
* Effectively and safely use a broad range of materials, components, tools, equipment and techniques to produce designed solutions [(VCDSCD051)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD051)
* Use project management processes to coordinate production of designed solutions [(VCDSCD053)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD053)
 | * Investigate and make judgements on how the characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions [(VCDSTC059)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC059)
* Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved [(VCDSTS054)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS054)
* Explain how designed solutions evolve with consideration of preferred futures and the impact of emerging technologies on design decisions [(VCDSTS055)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS055)
* Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to develop design ideas [(VCDSCD060)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD060)
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Key theme 3: Exploring characteristics and properties of materials

The ‘Ideas for the classroom’ in this theme promote skills, knowledge and understanding of concepts related to attributes identified by the senses and distinctive qualities of materials.

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|  | **Levels 7 and 8** | **Levels 9 and 10** |
| **Key messages** | * The properties of materials can be determined by using different testing techniques.
* The different properties of different materials determine how they are used in making products.
 | * Manufacturers and people creating products for a global future should be specifically required to consider environmental impacts.
* Selecting and using technologies and processes appropriately will support safe work practices.
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| **Ideas for the classroom** | * Discuss the characteristics of different technologies and consider the ways they might impact on the design of a product, such as how using laser cutters or 3D printers in industry might impact on product design.
* Create a list of the characteristics of two new technologies, such as 3D printing and rapid prototyping, and the possible impact of using them to create everyday products.
* Identify and conduct suitable tests to determine the physical and mechanical properties of different types of timber. The following properties could be tested: colour, appearance, hardness, moisture content, grain, shrinkage and swelling, strength, toughness, elasticity, warping, durability. [Examples of material tests](https://fuse.education.vic.gov.au/Resource/ByPin?Pin=D8WTXN&SearchScope=All) can be found on FUSE.
* Discuss the difference in the properties of knitted and woven cotton fabrics and identify uses of these two types of cotton fabric.
* Discuss how the absorption of water or dehydration of timber depends on atmospheric humidity. Identify issues related to the moisture content of timber.
* Compare the properties and uses of different types of timber, such as grey gum, jarrah and red cedar. Present information as an infographic.
* Explore the appearance, uses, workability and properties of engineered wood products.
* Bring in a range of different swatches of cotton fabric. Ask students to compare the properties. Discuss any differences in the properties of cotton swatches that are made from ethically produced fibres and the properties of those that are not.
* Provide a design brief that requires students to conduct testing of the characteristics and properties of materials, for example a design brief to create a water-resistant, lightweight bag to carry and protect a digital device.
* Assess the aesthetic properties, such as lustre, colour and texture, of different types of metals.
 | * Research the functional differences between cast iron, cast steel, and low, medium and high carbon steels.
* Explore the classification and uses of the major metal types used for furniture products, building and construction materials, and consumer products. Discuss the differences in the characteristics and properties of the different classifications of metals.
* Explore the properties of regenerated textile fibres such as rayon and acetate, and compare them with those of synthetic textile fibres such as polyester and nylon. Justify the use of manufactured textile fibres in particular types of clothing.
* Investigate the properties and characteristics of natural wood, such as wood and softwood, with that of manufactured board, such as plywood and fibre board. Justify a decision to use a particular type of wood or manufactured board when addressing a design brief that includes specific requirements such as the product being a reduced weight in order to reduce transport costs.
* Investigate the characteristics and properties of materials that would be suitable for a designed solution for a travel pillow with matching sleeping mask for a young adult.
* Test a variety of materials and their characteristics and properties. For example, if making a fabric visor or 3D-printed visor shades test the malleability of plastics and the elasticity of fabric. [Examples of material tests](https://fuse.education.vic.gov.au/Resource/ByPin?Pin=D8WTXN&SearchScope=All) can be found on FUSE.
 |
| **Content descriptions** | * Analyse ways to create designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment [(VCDSTC048)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC048)
* Investigate the ways in which designed solutions evolve locally, nationally, regionally and globally through the creativity, innovation and enterprise of individuals and groups [(VCDSTS044)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS044)
* Critique needs or opportunities for designing and investigate, analyse and select from a range of materials, components, tools, equipment and processes to develop design ideas [(VCDSCD049)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD049)
 | * Investigate and make judgements on how the characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions [(VCDSTC059)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC059)
* Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved [(VCDSTS054)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS054)
* Explain how designed solutions evolve with consideration of preferred futures and the impact of emerging technologies on design decisions [(VCDSTS055)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS055)
* Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to develop design ideas [(VCDSCD060)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD060)
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Key theme 4: Making sustainable and innovative products

The ‘Ideas for the classroom’ in this theme promote skills, knowledge and understanding of concepts related to problem-solving using the Creating Designed Solutions strand.

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|  | **Levels 7 and 8** | **Levels 9 and 10** |
| **Key messages** | * Existing product designs can be developed and modified to meet individual, family and community needs.
* Products can be developed to address ethical and social factors.
 | * Prototypes can be used to model and test design options.
* New materials can have positive and negative impacts on sustainability.
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| **Ideas for the classroom** | * Produce a product or range of products for an environment by modifying an existing product design in consultation with a community group. For example, produce a range of placemats or coasters from recycled plastic bags for a community centre.
* Produce a product or range of products for an environment by modifying an existing product design in consultation with a community group. For example, produce a scooter and/or skateboard stand for a local general store. Record the production steps in stages. List the production techniques, joining methods and materials that are used.
* Investigate existing products for an individual that consider ethical and/or social factors, such as woollen hand warmers for an elderly person or a step stool for a child. In groups discuss how the product considers ethical and/or social factors and present the findings to the class.
* Investigate environments that could be redeveloped in consultation with a community group, for example storage containers, shelving, racks and carry bags to hold and store specific sports equipment at local venues. Brainstorm ideas and discuss them with the class.
* Develop design ideas for an environment by modifying an existing product design in consultation with a community group. For example, investigate a local sports venue and its need for versatile carry bags to store and hold specific sports equipment.
* Consider the positive impacts of designed solutions that modify an existing product design, in consultation with a community group, for example containers, pot covers and signage for a bush tucker garden developed in consultation with local elders.
 | * Explore what is meant by ‘preferred futures’ and the roles designers can play as a part of these futures.
* Make and test prototypes of the preferred design option that responds to a design brief requiring a designed solution that considers the characteristics and properties of materials and their environmental impact. Examples are a wooden prayer stool or a laptop riser. The testing of prototypes could relate to determining a suitable size and height for a particular age range.
* Identify end users and brainstorm ideas to develop a design brief that addresses a sustainability problem or need. Include an outline of the situation and considerations (aspects that need to be considered that are specific to the product to be made) and constraints (aspects of a product that can’t be changed).
* Generate design ideas, either free-hand or using 3D modelling software such as SketchUp, to respond to a design brief that considers ethical and social factors. Further [information about SketchUp](https://fuse.education.vic.gov.au/ResourcePackage/ByPin?pin=7BJL84) can be found on FUSE.
* Produce multiple prototypes of a preferred design option that shows an understanding of key aesthetic considerations in the prototypes’ competing designs.
* Discuss the environmental consequences of using plastics such as polyester, nylon, acrylic and polyamide to make clothing and household products.
* Assess the use of recycled plastic bottles as a way to conserve resources and reduce waste, and identify negative environmental consequences.
* Test a variety of tools and equipment to create a product for a global preferred future that is designed with consideration as to its environmental impact, for example a laser-cut hair or moustache comb made from plywood or bamboo.
* Investigate suitable materials, including emerging materials, for a product that was designed with consideration as to the materials used and their environmental impact, for example nanomaterials. Analyse everyday products made from nanomaterials and discuss the positives and negatives with the class.
 |
| **Content descriptions** | * Analyse ways to create designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment [(VCDSTC048)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC048)
* Examine and prioritise competing factors including social, ethical, economic and sustainability considerations in the development of technologies and designed solutions to meet community needs for preferred futures [(VCDSTS043)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS043)
* Investigate the ways in which designed solutions evolve locally, nationally, regionally and globally through the creativity, innovation and enterprise of individuals and groups [(VCDSTS044)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS044)
* Generate, develop and test design ideas, plans and processes using appropriate technical terms and technologies including graphical representation techniques [(VCDSCD050)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD050)
* Effectively and safely use a broad range of materials, components, tools, equipment and techniques to produce designed solutions [(VCDSCD051)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD051)
 | * Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved [(VCDSTS054)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS054)
* Explain how designed solutions evolve with consideration of preferred futures and the impact of emerging technologies on design decisions [(VCDSTS055)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS055)
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* Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to develop design ideas [(VCDSCD060)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD060)
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