Australian Technologies curriculum

Jill Livett
DATTA Vic
The Australian Curriculum:

- **is required** to be taught within all schools in Victoria
  - Government and Catholic schools have agreed to, and are required to implement through AusVELS
  - Independent schools can choose to implement through AusVELS, or directly access the Australian Curriculum through the ACARA documentation, or offer an equivalent registered curriculum (e.g. IB)

- **has learning areas** (roughly equivalent to VELS domains)

- is mainly focused on **Foundation to Year 10** (some areas developed for senior secondary)
• the learning areas have been written and implemented during different phases
  – Phase one (implemented 2013)
    • English, Maths, Science, History (part of Humanities and Social Sciences: HSS)
  – Phase Two (implemented 2015, fully reported to by 2017)
    • The Arts, Geography (HSS)
  – Phase Three (implemented 2015 onwards, reported to by 2017)
    • Technologies, Health and Physical Education, Languages, Civics and Citizenship (HSS), Economics and Business (HSS), Work Studies (Years 9-10)
Other curriculum areas to be incorporated into all learning areas

• General capabilities
  – literacy, numeracy, ICT, creative and critical thinking, personal and social capability, ethical understanding, intercultural understanding (AusVELS)

• Cross Curriculum Capabilities
  – Studies of Aboriginal and Torres Straits Islander Histories and Culture
  – Asia and Australia’s engagement with Asia
  – Sustainability
current state of play

- Australian Curriculum Review
  - Commissioned by federal Education Minister Pyne
  - Review released in October
  - Recommendations that affect D&T
    - That the Technologies learning area be introduced from Year 9 (or from Year 7 in some sections of the report)
    - That the 2 strands (Knowledge and understanding, and processes and production skills) be integrated
  - Some decisions about the curriculum will be made at the Ministers of Education meeting on Dec 12th
  - Currently, the Victorian position is that we will continuing implementing in accordance with the VCAA Curriculum Planning Guidelines (Technologies drawn on F-2, reported on 3-8, elective 9-10)
Technologies aims to develop the knowledge, understanding and skills to ensure that, individually and collaboratively, students:

• investigate, design, plan, manage, produce and evaluate technologies solutions (what does this sound like?)

• are creative, innovative and enterprising when using traditional, contemporary and emerging technologies, and understand how technologies have developed over time

• make informed and ethical decisions about the role, impact and use of technologies in society and for a sustainable future

• engage confidently with and responsibly select and manipulate appropriate technologies — resources, materials, data, systems, tools and equipment — when designing and creating solutions

• critique and evaluate problems, needs or opportunities to identify and create solutions

ACARA Technologies Curriculum (Feb 2014, published, not yet endorsed)
Design and Technologies aims

- develop confidence as critical users of technologies, and designers and producers of designed solutions
- investigate, generate and critique innovative and ethical designed solutions for sustainable futures
- use design and systems thinking to generate design ideas and communicate these to a range of audiences
- produce designed solutions suitable for a range of technologies contexts by selecting and manipulating a range of materials, systems, components, tools and equipment creatively, competently and safely; and managing processes
- evaluate processes and designed solutions and transfer knowledge and skills to new situations
- understand the roles and responsibilities of people in design and technologies occupations and how they contribute to society
technologies - key ideas

• Preferred futures
  – students critique, design and make solutions that create the sort of future that is beneficial for all

• Project management
  – developing students’ ability to plan and manage their project work effectively – logical planning, use of time, equipment, and materials
• Systems thinking
• Design thinking
• Computational thinking

• *what are these types of thinking?*
• **Systems thinking** – an holistic approach to identifying and solving a problem – looking at interactions and interrelationships, their impacts on the whole

• **Design thinking** – using strategies to understand the design need and opportunities, generate creative and innovative ideas, planning and evaluating what best suits the need

• **Computational thinking** – problem solving method used in digital technologies – to organise data logically, break a problem into parts, interpret patterns and models, designing and implementing algorithms
the Technologies learning area

- is core from F-8, some flexibility at 9-10
- is divided into two subject areas
  - Design and Technologies
  - Digital Technologies
• the Technologies curriculum is organised through:
  – **bands** that group year levels together
    • F-2, 3-4, 5-6, 7-8, 9-10
  – Each subject has a distinctive curriculum that is organised into:
    • **strands**
    • **content descriptions**
    • **elaborations (suggestions)**
    • **achievement standards**
## Technologies strands

<table>
<thead>
<tr>
<th>Design and Technologies</th>
<th>Digital Technologies</th>
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</thead>
<tbody>
<tr>
<td><strong>Knowledge and understanding</strong></td>
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</tr>
<tr>
<td><strong>Technologies and society</strong></td>
<td><strong>Digital systems</strong></td>
</tr>
<tr>
<td>- the use, development and impact of technologies in people’s lives</td>
<td>- the components of digital systems: hardware, software and networks and their use</td>
</tr>
<tr>
<td><strong>Technologies contexts</strong></td>
<td><strong>Representation of data</strong></td>
</tr>
<tr>
<td>- technologies and design across a range of technologies contexts</td>
<td>- how data are represented and structured symbolically</td>
</tr>
<tr>
<td><strong>Processes and production skills</strong></td>
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</tr>
<tr>
<td><strong>Creating designed solutions by:</strong></td>
<td><strong>Collecting, managing and analysing data</strong></td>
</tr>
<tr>
<td>- investigating</td>
<td>- defining</td>
</tr>
<tr>
<td>- generating</td>
<td>- designing</td>
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<tr>
<td>- producing</td>
<td>- implementing</td>
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<tr>
<td>- evaluating</td>
<td>- evaluating</td>
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<tr>
<td>- collaborating and managing</td>
<td>- collaborating and managing</td>
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in the D&T subject, there are four contexts (specialisation areas)

• Engineering Principles and Systems
• Food and Fibre Production
• Food Specialisation
• Materials and Technologies Specialisations

At each band level from F-8, all students are required to undertake learning in all contexts

*In F-2, Food and Fibre Production and Food Specialisation are combined
Engineering Principles and Systems

- similar to the VELS Systems Technology
- related to forces that are used to create light, sound, heat, movements, control or support in systems.
Food and fibre production

• covers the development and production of primary resources – agriculture, horticulture, aquaculture, forestry, etc.
Food specialisation
• exploring the characteristics and properties of food and their importance in maintaining health – involves designing/developing and making food products and services
**Materials and Technologies specialisations**

- exploring the characteristics and properties of materials – including wood, metal, plastics, textiles, paper, cardboard, composites, smart materials.

– *In later years, this context can also cover specific specialisations, including VCD, architecture, fashion, electronics, etc.*
All students need to create a range of **designed solutions** during each band. At least one:

- product
- environment
- service
designed solutions

a product

• a physical or tangible result of a design process that meets a need (e.g. chair, dress, meal, electronic circuit, an app, an advertising pamphlet, etc.)
designed solutions

an environment

- the result of a design process that is a space or place that can be natural, managed or built e.g. room interior, garden, cubby house, play area, etc.
a service

- the result of a design process that is less tangible – e.g. a maintenance plan, cafe or catering service, communication service or provision, transportation service system, usually explained through plans, flow charts, diagrams procedures, etc.
design and technologies
processes

A term that is used frequently, seems to mean:

- the design process (VELS) - **but**
- plural – not one set process, but varying forms of process that are different - dependent on the situation, types of solution and level of students
- covers designing, production and evaluation stages
- it doesn’t mean the individual processes used in production
Reference point – available as a download

- contains the strands and content descriptions for each band

<table>
<thead>
<tr>
<th>Design and Technologies Foundation to Year 10 scope and sequence</th>
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<tbody>
<tr>
<td><strong>Technologies and society</strong></td>
</tr>
<tr>
<td>2.1 Explore how people, design and produce (make) familiar products, services and environments to meet personal and local community needs and consider sustainability.</td>
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<tr>
<td>4.1 Recognise and explore factors, including sustainability and the role of those in design and technologies occupations, that impact on the design of products, services and environments to meet community needs.</td>
</tr>
<tr>
<td>6.1 Investigate how those in design and technologies occupations address competing considerations, locally, regionally and globally, in the design of products, services, and environments and consider the impact on sustainability.</td>
</tr>
<tr>
<td>8.1 Examine and present including ethical, social and the development of sustainable solutions to meet community needs.</td>
</tr>
<tr>
<td>8.2 Investigate the ways services and environments, regionally and globally, can be developed and evaluated.</td>
</tr>
<tr>
<td><strong>Technologies contexts</strong></td>
</tr>
<tr>
<td>By the end of Year 2 students will have had the opportunity to design, produce (make) and evaluate designed solutions in at least three technologies contexts below.</td>
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<tr>
<td>By the end of Year 4 students will have had the opportunity to design, produce (make) and evaluate designed solutions in at least the three technologies contexts below.</td>
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<tr>
<td>By the end of Year 6 students will have had the opportunity to design, produce (make) and evaluate designed solutions in at least the four technologies contexts below.</td>
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<tr>
<td>By the end of Year 8 students will have had the opportunity to design, produce (make) and evaluate designed solutions in at least the six technologies contexts below.</td>
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<tr>
<td><strong>Engineering principles and systems</strong></td>
</tr>
<tr>
<td>2.2 Explore the way designs use forces to create movement in systems and products.</td>
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<tr>
<td>4.2 Investigate how forces and the properties of materials affect the behaviour of a product or system.</td>
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<tr>
<td>6.2 Investigate how forces or electrical energy can control movement, sound or light in a designed product or system.</td>
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<tr>
<td>8.2 Investigate how these forces can be used to manipulate and systems when designing designed solutions.</td>
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<tr>
<td><strong>Food and fibre production</strong></td>
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<tr>
<td>2.3 Explore the way systems of care for plants and animals that are grown, reared and processed for food, clothing and shelter and how food is prepared for healthy eating.</td>
</tr>
<tr>
<td>4.3 Investigate the contribution food and fibre production and food technologies make to modern and traditional societies.</td>
</tr>
<tr>
<td>6.3 Investigate sustainable resource management practices in food and fibre production.</td>
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<tr>
<td>8.4 Investigate how food and fibre systems can be designed to maintain food safety and hygiene.</td>
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<tr>
<td><strong>Food specialisation</strong></td>
</tr>
<tr>
<td>2.4 Explore how the properties of materials and components are used to create designed solutions.</td>
</tr>
<tr>
<td>4.4 Investigate the effectiveness of technologies, materials, systems, tools and equipment for a range of purposes.</td>
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<tr>
<td>6.5 Investigate characteristics and properties of a range of technologies, materials, systems, tools and equipment and evaluate the impact of their use.</td>
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<tr>
<td>8.5 Analyse ways to create technological specialisations combining characteristics resources.</td>
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**Design and processes**

<table>
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<tr>
<td>2.5 Explore needs or opportunities for designing and the resources needed to realise designed solutions.</td>
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<tr>
<td>4.5 Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques to produce designed solutions.</td>
</tr>
<tr>
<td>6.6 Critique needs or opportunities for designing and explore and test a variety of materials, components, tools, equipment and processes to achieve intended designed solutions.</td>
</tr>
<tr>
<td>8.7 Critique needs or opportunities for designing and explore and test a variety of materials, components, tools, equipment and processes to achieve intended designed solutions.</td>
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**Concepting, developing and communicating ideas**

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<tr>
<td>2.6 Visualise, generate, develop and communicate design ideas through describing, drawing and modelling.</td>
</tr>
<tr>
<td>4.6 Generate, develop and communicate design ideas and decisions using appropriate technical terminology and graphical representation techniques.</td>
</tr>
<tr>
<td>6.7 Generate, develop, evaluate and communicate design ideas and processes for different audiences, using various technical terminology and appropriate techniques.</td>
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<tr>
<td>8.8 Generate, develop and communicate design ideas and processes for different audiences, using a range of techniques.</td>
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**Planning and Project planning**

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<td>2.7 Plan steps for making designed solutions.</td>
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<tr>
<td>4.7 Develop plans to manage production.</td>
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<td>6.8 Develop project plans that include...</td>
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<td>8.9 Use project planning...</td>
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</tbody>
</table>
band descriptions

Contains:

- the strand and content descriptions
- indications of links to General Capabilities and Cross Curriculum Priorities
- Elaborations
  - suggestions of how the content could be taught (for guidance and directions, not required)
- Achievement Standards
  - expected student capabilities at the end of the band level (assessment?)
learning in design and technologies

Key ideas

• use of design briefs

![Design Brief]

My client, Karen Marie, requires a table or a set of tables be made to use when her friends and family come to visit. Karen has suggested that she would like the table/s to be of a style that reflects her likes and interests. She has collected several pieces of art and has a passion for surrealist style art. Karen would like the table/s to be constructed using materials that will complement her existing furniture, as well as keeping in mind the environment and renewable resources.

The table/s must be stable as she will use them regularly as extra to make it easier for her guests when entertaining. The tables will be used for placing drinks or small plates of food on. She has suggested that the table/s may have a drawer for storing small goods, this is optional. When the table/s are not in use, they will be stored against a wall in her hallway, so as not to be too compact a design. Karen is single, in her early thirties and works full time. She has a mortgage which leaves her with a mid-range disposable income. She is willing to spend approximately £500.00 and needs the table/s to be ready in 4-6 weeks for a party she will be hosting tentatively planned for 10 weeks time.

CONSIDERATIONS
• The table/s will be used regularly
• The table/s may have a drawer
• The style is to reflect her like and interests – surrealist art
• Materials are environmentally friendly
• E.g., bamboo for the height of table/s – sitting
• Appropriate size for table top
• What materials and styles would be suitable
• Storage – how to make compact

QUALITY STATEMENT
The table/s are to be constructed to a high quality standard. The finished product must be stable, compact and functional. The product should consider the environment and have a professional finish.
Factors influencing design decisions

- sustainability and ethics
- function
- aesthetics
- enterprise and marketing
- work health and safety
Progression of production skills

- producing designs and products/solutions
- managing projects and collaboration
VCAA will publish the AusVELS version of the Technologies area in Term 3

Technologies will be core/mandatory from Year 3-8, optional/elective in Years 9-10,

Foundation-2 – it will be ‘drawn on’ to develop curriculum

VCD – in the Materials Specialisation of Design and Technologies (only mention in the Australian Curriculum – not in the Arts) – VCAA is writing a VCD curriculum to be included in the AusVELS Arts curriculum for 7-10
Covering all contexts
Covering all types of designed solutions – products, environments and services?
• do we know what they are? May require targeted professional learning for teachers

Covering all of the Cross Curriculum Priorities?
• Sustainability is ‘natural fit’ for the Technologies area – the other two areas may be much more difficult
• Shouldn’t be an ‘add on’ – should be relevant

Time
• division of Technologies time (into subjects and contexts) shouldn’t be ‘equal’ – some areas have much more content than others
resources

• General
  – Scootle
  – National STEM Centre UK - http://www.nationalstemcentre.org.uk/elibrary/technology/

resources

- Sustainability
  - www.thesecretnlifeofthings.com
  - www.ecodesigners.com.au
  - http://practicalaction.org/schools
  - Fairtrade
- Asia and Australia’s engagement with Asia – suggested areas
  - Product design (miniturisation, small space, ethnic, fashion e.g. harajuku), food
- Aboriginal and Torres Straits Islander cultures and histories
  - textiles design, cloaks, bush mechanics, food

*Brainstorm*