

DATTA Vic STEM Resources



Title: Eco Centre project

Year level: Year 7-10

Authors:

Description: The Development of an Eco Centre area within the school grounds. Establishment of a billabong eco-system

Timeline:

Year 1-2

- Establishment of a billabong eco-systems
- Development of a system for watering – automated maintenance

Year 2-3

- Development of a data-logging system monitoring trends over time
- Continuation of eco-system maintenance
- Introduction of a recycling centre – both organic and inorganic

Year 3 Onwards – Potential

- Introduction of weather station monitoring system to connect with data logging through phone apps etc. – remote control?
- Design sustainable work wear to use when maintaining the area

Resources Required:

- A suitable area of the school for the project

Teacher & Timetabling Approach:

- Potential to be run within semester electives and tied to core curriculum (Maths)
- Requires specialist PD/Systems, Environmental Science and Maths teachers

Curriculum Benchmarking:

THE BILLABONG:

Design & Technology Levels 7/8

- **Technologies & Society:** Examine & prioritise competing factors including social, ethical, economic and sustainability considerations in the development of technologies & designed solutions to meet community needs for preferred futures
- **Food & Fibre Production:** Analyse how food and fibre are produced when creating managed environments and how these can become more sustainable

Design & Technology Levels 9/10

- **Technologies & Society:** 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

- **Technologies & Society:** Explain how designed solutions evolve with consideration of preferred futures and the impact of emerging technologies on design decisions
 - **Materials & Technologies Specialisations:** Investigate and make judgements on how the characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions
 - **Creating Designed Solutions – Investigating:** 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
 - **Creating Designed Solutions - Producing:** Work flexibly to safety test, select, justify and use appropriate technologies & processes to make designed solutions
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Science Levels 7/8

- **Science Understanding – Science as a Human Endeavour:** Scientific knowledge and understanding of the world changes as new evidence becomes available; science knowledge can develop through collaboration and connecting ideas across disciplines and practice of science
- **Science Understanding – Science as a Human Endeavour:** Science & technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations
- **Biological Sciences:** There are differences between groups of organisms; classification helps organise this diversity
- **Biological Sciences:** Multicellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce
- **Chemical Sciences:** Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques
- **Physical Sciences:** Energy appears in different forms including movement (kinetic energy), heat, light, chemical energy and potential energy; devices can change energy from one form to another
- **Science Inquiry Skills- Recording & Processing:** Construct & use a range of representations including graphs, keys and models to record and summarise data from students' own investigations and secondary sources, and to represent and analyse patterns and relationships
- **Science Inquiry Skills- Analysing & Evaluating:** Use scientific knowledge and findings from investigations to identify relationships, evaluate claims and draw conclusions
- **Science Inquiry Skills- Analysing & Evaluating:** Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method

Science Levels 9/10

- **Science Understanding – Science as a Human Endeavour:** Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community
- **Biological Sciences:** Multicellular organisms rely on coordinated and interdependent internal systems to respond to changes in their environment
- **Biological Sciences:** Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems
- **Chemical Science:** Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction mass is not created or destroyed
- **Earth & Space Science:** Global systems, including the carbon cycle, rely on interactions involving the atmosphere, biosphere, hydrosphere and lithosphere

- **Science Inquiry Skills-Communicating:** Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations
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Mathematics Measurement & Geometry Level 8

- **Using Units of Measurements:** Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites
- **Using Units of Measurements:** Solve problems involving duration, including using 12-and 24-hour time within a single time zone
- **Geometric Reasoning:** Develop the conditions for the congruence of triangles

Mathematics Number & Algebra Level 8

- **Linear & Non-Linear Relationships:** Plot linear relationships on the Cartesian plane with and without the use of digital technologies

Mathematics Measurement & Geometry Level 9

- **Using Units of Measurements:** Calculate the surface area and volume of cylinders and solve related problems
- **Geometric Reasoning:** Use the enlargement transformation to explain similarity and develop the conditions for triangles to be similar

Mathematics Measurement & Geometry Level 10

- **Geometric Reasoning:** Formulate proofs involving congruent triangles and angle properties
 - **Geometric Reasoning:** Solve simple trigonometric equations
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THE MONITORING SYSTEM

Design & Technology Levels 7/8

- **Technologies Contexts – Engineering Principles & Systems:** Analyse how motion, force and energy are used to manipulate and control electromechanical systems when creating simple, engineered solutions
- **Technologies & Society:** Investigate the ways in which designed solutions evolve locally, nationally, regionally and globally through the creativity, innovation and enterprise of individuals and groups
- **Materials & Technologies Specialisations:** Analyse ways to create designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment
- **Creating Designed Solutions – Investigating:** 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

Design & Technology Levels 9/10

- **Technologies Contexts – Engineering Principles & Systems:** Investigate and make judgements on how the characteristics and properties of materials are combined with force, motion and energy to create engineered solutions

- **Food & Fibre Production:** Investigate and make judgements on the ethical and sustainable production and marketing of food and fibre
 - **Food Specialisations:** Investigate and make judgements on how the principles of food safety, preservation, preparation, presentation sensory perceptions influence the creation of food solutions for healthy eating
 - **Creating Design Solutions – Investigating:** Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to create designed solutions
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Science Levels 9/10

- **Physical Sciences:** Electric circuits can be designed for diverse purposes using different components; the operation of circuits can be explained by the concepts of voltage and current
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Mathematics Measurement & Geometry Level 8

- **Geometric Reasoning:** Develop the conditions for the congruence of triangles

Mathematics Number & Algebra Level 8

- **Linear & Non-Linear Relationships:** Plot graphs of non-linear real life data with and without the use of digital technologies, and interpret and analyse these graphs

Mathematics Number & Algebra Level 9

- **Patterns & Algebra:** Apply set structures to solve real-world problems
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Digital Technologies Level 7/8

- **Creating Digital Solutions:** Design the user experience of a digital system, generating, evaluation and communicating alternative designs
 - **Creating Digital Solutions:** Develop and modify programs with user interfaces involving branching, iteration and functions using a general-purpose programming language
 - **Creating Digital Solutions:** Evaluate how well student-developed solutions and existing information systems meet needs, are innovative and take account of future risks and sustainability
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THE RECYCLING CENTRE

Design & Technology Levels 7/8

- **Food & Fibre Production:** Analyse how food and fibre are produced when creating managed environments and how these can become more sustainable
- **Creating Designed Solutions – Investigating:** 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
- **Creating Designed Solutions – Producing:** Effectively & safely use a broad range of materials, components, tools, equipment & techniques to produce designed solutions

Design & Technology Levels 9/10

- **Creating Designed Solutions – Investigating:** 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
 - **Creating Designed Solutions – Producing:** Work flexibly to safely test, select, justify and use appropriate technologies and processes to make designed solutions
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Science Levels 7/8

- **Science Understanding – Science as a Human Endeavour:** Scientific knowledge and understanding of the world changes as new evidence becomes available; science knowledge can develop through collaboration and connecting ideas across disciplines and practice of science
- **Science Understanding – Science as a Human Endeavour:** Science & technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations

Science Levels 9/10

- **Science Understanding – Science as a Human Endeavour:** Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community
 - **Science Understanding – Science as a Human Endeavour:** Advances in Scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries
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Mathematics Measurement & Geometry Level 8

- **Using Units of Measurements:** Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites
 - **Using Units of Measurements:** Solve problems involving duration, including using 12-and 24-hour time within a single time zone
 - **Geometric Reasoning:** Develop the conditions for the congruence of triangles
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CLOTHING DESIGN

Design & Technology Levels 7/8

- **Creating Designed Solutions- Generating:** Generate, develop and test design ideas, plans and processes using appropriate technical terms and technologies including graphical representation techniques
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Mathematics Number and Algebra Level 8

- **Real Numbers:** Solve problems involving the use of percentages, including percentage increases and decreases and percentage error, with and without digital technologies
- **Money & Financial Mathematics:** Solve problems involving profit and loss, with and without digital technologies