# Stage 3: Ecospace - Teaching and learning sequence

## Curriculum focus: Science and Technology Years K-6 Syllabus

Focus outcomes:

***Built Environments***– A student:

* ST3-14BE - describes systems in built environments and how social and environmental factors influence their design
* ST3-5WT - plans and implements a design process, selecting a range of tools, equipment, materials and techniques to produce solutions that address the design criteria and identified constraints

***Material World*** *–* A student*:*

* ST3-13MW - describes how the properties of materials determine their use for specific purposes
* ST3-4WS - investigates by posing questions, including testable questions, making predictions, and gathering data to draw evidence-based conclusions and to develop explanations

***Physical World***– A student:

* ST3-6PW - describes how scientific understanding about sources, transfer and transformation of electricity is related to making decisions about its use.

Students will study:

* the school as a place that uses energy
* the sources of energy consumed
* how spaces can be modified to make more sustainable use of energy.

**Design brief**

**Design situation**: School spaces are used by a large number of people for different purposes and often consume large quantities of energy. Much of this energy is obtained from non-renewable sources. By modifying the built environment, schools can reduce both the quantity of non-renewable energy used and its monetary cost.

**Design task:** Design and propose modifications to a school space to improve the sustainability of energy consumed while meeting the needs of users of the space.

**Design solution:** The solution will be in the form of a proposal including drawings, photos, sample materials and/or a multi-media presentation. Models may be produced as a means of communicating details of the solution but are not essential. The proposal will include information about the existing situation, the needs of users, and details of the design solution including diagrams, plans and images of what the solution will look like.

**Criteria for the selection of a space**

As the focus of the students’ design activity, a space should be identified that:

* is accessible to students on a regular basis
* is safe for students to observe and record information about its uses
* has potential for modification using passive design techniques to improve the internal conditions without using electricity.

# Overview of learning experiences

|  | **Learning experience** | **Purpose of the learning experience** |
| --- | --- | --- |
| **Explore and define the task** | **Analyse the design task**   * What do we mean by learning spaces? How can we modify them without increasing electricity consumption? * What makes a school space suitable for learning? * Energy: Where does it come from? What is it used for? * Renewable and Non-renewable sources. | Students investigate the design task and explore what is required.  Students recognise the link between carrying out scientific investigations (to gain knowledge) and application of that knowledge through a design process (to produce design solutions).  Students recognise relationship between a comfortable, clean, useful learning space and effective learning.  They gain understanding of production and use of electricity. They develop awareness of sustainability and practices that can reduce energy consumption/reliance on electricity.  Students recognise difference between renewable and non-renewable resources and how these are used to control the internal environment in learning spaces. |
| **Investigating your school – School Safari**   * At school, what is electricity used for? * What resources are used to produce electricity? Which resources used are finite and which are sustainable? * What features of learning spaces could be modified to reduce the reliance on electricity? | Students take part in the ‘School Safari’ – investigate and record data from 3 learning spaces dedicated to different uses. Analyse electricity usage, control of internal environmental conditions and consider natural sources of heat and light.  Create a site map of the school identifying the learning spaces and describing existing features and impact on usage. |
| **Consider your environment**   * Analysis of Australian housing designed for specific areas/environmental conditions. * Research of traditional house design in other countries/cultures as comparison. * Passive solar design and environmentally friendly sustainable practices in architecture | Engage in activity exploring features designed to suit climate/environment and draw comparisons/differences between building designs in other countries  Discuss specific passive design features/elements that could be used to improve learning spaces/reduce electricity reliance. |
| **Generate and develop ideas** | **Developing a design brief**   * Discuss and become familiar with the task * Understand the design process * Develop a team brief using Team Folio * Develop criteria for success | Developing skills in analysing a task - how well a learning space meets the needs of users and how learning can be positively or negatively affected. What can be done to modify/improve?  Understanding how people can work together in design teams taking on different roles.  Developing appropriate criteria to manage the development of the task and evaluate its success. |
| **Work Scientifically**   * Purposing and using scientific investigations to gain knowledge * Planning, conducting and analysing the results of a range of scientific investigations * Drawing conclusions that can be used in design work. | Students examine the online resources and plan a series of scientific investigations that will help them gain useful knowledge about passive design.  Students record data and ensure scientific process is fair and accurate.  Students analyse data and draw conclusions. |
| **Create redesign Solutions**   * Review of conclusions and sharing of ideas within teams * Create mind map of initial ideas * Create annotated sketches of initial ideas * Share ideas with class/peers - gain meaningful feedback – modify designs. | Identifying and communicating opportunities to develop the space to better meet users’ needs.  Development of skills in creating communication of ideas – mind maps, sketching, verbal communication, ideas presentation.  Assessing feedback from peers and considering design modification in line with feedback |
| **Produce solutions** | **Plan your Presentation**   * Time and resource management skills * Allocation of tasks * Collaborative team work * Pitching communication appropriately to the audience * Effective communication tools and techniques   Requirements of a proposal:   * What does it need to communicate? * What information will different stakeholders require? * Where and when will the proposal be presented? | Students project manage the development of their proposal to the appropriate audience, learning time management skills and resource allocation skills.  Students explore a wide range of communication techniques and media and select those most appropriate.  Students recognise the components of a proposal, the intent of delivering a proposal to gain acceptance from authority and ensure that the proposal utilises a variety of media for the presentation. |
| **Produce Communication Devices**  3D models  Sketches and drawings  Posters  Pamphlets  Video  Slideshow  Multimedia Presentation | Hands-on activities in the design and construction of models to present ideas and the production of presentation technical drawings should be completed in this stage.  Students explore and evaluate a wide range of communication styles, techniques and devices selecting the mode and media that most appropriately conveys their design ideas to their chosen audience. |
| **Present your Ideas** Presentation of team proposals to the principal and community to gauge feedback and gain approval. | Communicating, advocating and defending a development proposal. Students learn to collaborate and cooperate on a task, share duties, recognise talents and skills. Develop confidence in presentation and develop a sense of achievement in completion of a task. |
|  | **Reflection and final evaluation** What went well?  What was difficult?  What did you learn?  What would you change if you did it again? | Reflecting on scientific process.  Reflecting on design processes.  Reflecting on design solutions.  Reflecting on the link between the knowledge we discovered and its application through design work. |

**Making the changes (optional)**

* Planning implementation
* Monitoring implementation
* Evaluating implementation