 Stage 3 STEM unit — Term 3 2016

Big ideas — what do I want the students to learn?

* What is a built environment? What purpose does it serve?
* How are built environments designed to meet the needs and wants of a specific group of people/users?
* How do social factors influence the design of a built environment?
* How do environmental factors influence the design of a built environment?

Outcomes

Science and Technology

Knowledge and Understanding

ST3-14BE

describes systems in built environments and how social and environmental factors influence their design

ST3-16P

describes systems used to produce or manufacture products, and the social and environmental influences on product design

Working scientifically

ST3-4WS

A student investigates by posing questions, including testable questions, making predictions and gathering data to draw evidence-based conclusions and develop explanations

Working technologically

ST3-5WT

A student 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

Values and attitudes

ST3-2VA

A student demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futures

ST3-1VA

shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunities

[Science (incorporating Science and Technology K-6) K-10 Syllabus](http://syllabus.nesa.nsw.edu.au/science/science-k10/) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2012

Mathematics

MA3-1WM

describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions.

MA3-2WM

selects and applies appropriate problem solving strategies, including the use of digital technologies, in undertaking technology, to solve problems.

MA3-3WM

gives a valid reason for supporting one possible solution over another.

MA3-5NA

selects and applies appropriate strategies for addition and subtraction with counting numbers of any size

MA3-9MG

interpret decimal notation for lengths and distances, solve problems involving the comparison of lengths using appropriate units.

MA3-10MG

selects and uses the appropriate unit to calculate areas, including areas of squares, rectangles and triangles

MA3-17MG

locates and describes position on maps using a grid-reference system

[Mathematics K-10 Syllabus](http://syllabus.nesa.nsw.edu.au/mathematics/mathematics-k10/) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2012

Assessments

* portfolio of learning showcasing progress throughout the term — ClassDojo/seesaw
* 2D Document – drawn/created using Google Sketchup 3D
* create 3D Model of classroom

Explicit teaching

Google Sketchup — a YouTube video of a tutorial for building a house in Google Sketchup <https://www.youtube.com/watch?v=wM8mOZTQPwY>

Mathematics — area, scale, position (compass), length, perimeter, addition, subtraction, money

building design — A PBS website with interactive information on buildings <http://www.pbs.org/wgbh/buildingbig/lab/shapes.html>

Key inquiry question

How do building designs meet the social and environmental needs of users?

The hook — week 1

To initiate students into the unit of work.

YouTube video on sustainable demountable classrooms — <https://www.youtube.com/watch?v=w7umFveCDFA>

* cost of running a classroom
* need to design a cost effective and functional classroom
* letter from Mr Mayhew to challenge to build a relocatable affordable and ecofriendly classroom — figures of electricity bills, paper, furniture, budget, size of area 150 sq. 5 years — housing and population increase, which equals increased enrolments.
* video/pictures. Film Steve

Inquiry question 1 (4 weeks)

(Weeks 1, 2, 3, 4)

* What is a built environment?
* What purpose does it serve?
* What factors influence the design of built environments (social and environmental)?

Inquiry question 2 (6 weeks)

(Weeks 4, 5, 6, 7, 8, 9)

How can built environments be designed and constructed on a budget, while incorporating sustainable environmental practices? eg the use of recycled materials, natural lighting and solar energy

Gather G

Students gather data about the topic, do observations, conduct experiments, and make calculations.

* KWL what is a built environment, what purpose does it serve and what factors influence the design of built environments (social and environmental
* display examples of built/natural/ built ecofriendly school/classroom furniture building/buildings eg house, cave & Tullimbar PS. Focus on ecofriendly
* form groups of 3-4
* student groups use technology to find pictures of ecofriendly building internal and external

Where have sustainable systems been implemented in our schools?

What could we implement in our school? Eg solar power, hydro, recycling, composting, air ventilation.

* YouTube video on sustainable demountable classrooms — <https://www.youtube.com/watch?v=w7umFveCDFA>
* post video and website (building) links on google classroom
* teacher-modelled brainstorming
* student groups brainstorm/mindmap sustainable practices and choose a renewable energy/combination source to power classroom effectively year round
* choose building materials/landscape materials to fit into budget (link building document and link to Bunnings for list)

Organise O

Set out the data gathered – for example: use a retrieval chart.

* student groups create a picture collage/picture mind map of ecofriendly building and environments
* groups upload picture collage/picture mind map to google classroom

Create and gather a list of materials required for project making.

Student groups use excel/table in word to create a budget breakdown based on their draft classroom.

Analyse A

Teacher led — what have we collected or found? What are you going to do with the knowledge?

* groups share their picture collage with class and teacher/students analyse each collage
* groups write down
* the pros and cons of each ecofriendly design building/internal/external environment
* networking with other groups

Teacher models a group’s budget and discusses student choices and what could be added/chucked/changed.

Synthesise S

Most important part – to shift the students thinking.

* student groups use feedback from analyse to create a more succinct annotated {social and environmental influences and purposes} (eg large windows to let in natural sunlight) picture collage focused on their future design
* groups upload their picture collage/mind map to google classroom

Student groups use feedback from analyse to create a more succinct budget plans.

Students groups use google sketch up to create a 3D model of their ecofriendly classroom design.

Apply A

What has been learned is applied to a new task or situation.

* student groups design a draft labelled floor plan and technical drawing plan (side, rear, top, 3D and front view) and internal and external views of their ecofriendly classroom
* teacher gives feedback to each drawing
* explicit teaching — length, area, scale, position. Modelled example
* mathematics — position, scale, area, length

Students groups begin building their ecofriendly classroom using hands-on materials

Peer and teacher feedback session throughout building process.

Student groups complete building ecofriendly classroom

Student groups create a portfolio of learning digital/hardcopy

Concluding question

How do building designs meet the social and environmental needs of users?

Culminating activity (final — week 10)

Stage 3 viewing day teacher/students/Mr Mayhew

Winner

2nd Runner up

3rd Runner up

4th Runner up

Newsletter winners

School website winners

Office display winners

Resources

pictures of built/ecofriendly/natural environments

pros and cons table template

A3 & A4 paper

floor plan examples

technical drawing examples of houses (side, rear, front and 3D)

class dojo-message resources

Website on demountable classrooms — <http://www.demountables.com.au/classroom>

Bunnings Warehouse website — <https://www.bunnings.com.au/>

Microsoft Excel

Microsoft Word

Google Sketchup

Assessment criteria

all tasks draft drawing/picture college/google sketch up/building

manipulate

kid friendly

teacher specific

Material budget

* sustainable energy budget-hydropower, etc
* landscape materials
* building materials