DTM LEARNING TASK 3

Title: Sustainability for our school

ALIGNED WITH AUSTRALIAN TECHNOLOGY CURRICULUM:

Digital Technologies:
Manage the creation and communication of ideas and information including online collaborative projects, applying agreed ethical, social and technical protocols (ACTDIP022)

Design and Technologies
Investigate how people in design and technologies occupations address competing considerations, including sustainability in the design of products, services and environments for current and future use (ACTDEK019)

Investigate how forces or electrical energy can control movement, sound or light in a designed product or system (ACTDEK020)

Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions (ACTDEP024)

Negotiate criteria for success that include consideration of sustainability to evaluate design ideas, processes and solutions (ACTDEP027)

Develop project plans that include consideration of resources when making designed solutions individually and collaboratively (ACTDEP028)

Introduction of Task
* Problem - Our school needs to become more sustainable. How could we improve our energy efficiency in our school?
* Design and construct a model of our school to scale that is more energy efficient and sustainable.
* Create a report which outlines the benefits of making our school more sustainable.
* How could we get the community involved?

Focus Questions:
How can we improve our school reusable resources and reduce energy consumption?
How can we make our school more green?
How can we make our school more sustainable?
What have we already in place? How could we improve on that?
How could we get the whole school involved and the wider community?

Materials required:
- ☑ Student Workbooks
- ☑ School Model material
    - 60 x 70 cm board per partner
    - cardboard boxes
    - jar lids
    - paper towel/toilet rolls
    - pop-sticks
    - glue

- foil
- foam boards
- pieces of scrap rubber, bottle caps and fly screen
- PVA, Spray adhesive and hot glue
- corrugated card and natural sea sponges
- Lego
- Feathers
- tooth picks
- beads
- Metal rulers & craft desk mats
- Try-square, T-square or set-square

Digital Equipment

- ☑ Student Laptops
- ☑ Wordprocessing application.
- ☑ IPads or Camera to take photographs.

Online Resources Teacher are to use

- ☑ Teacher school plan sample: http://www.scribblemaps.com/maps/view/1DKQ6hg0S8
- ☑ Mind map sample https://www.mindmeister.com/449650560

Online Resources Students are to use

- ☑ Energy Quest http://energyquest.ca.gov/index.html
- ☑ Your carbon diet (energy consumption and efficiency of products in our environment, e.g., washing machine and cars) http://www.pbs.org/wgbh/warming/carbon/playalready.html
- ☑ Kids Korner Energy Education is fun - http://www.fplsafetyworld.com/?ver=kkblue&utilid=fplforkids&id=16160
- ☑ TVA Kids - http://www.tvakids.com/cfl.htm
- ☑ Alliant Energy - http://www.alliantenergykids.com/EnergyandTheEnvironment/SavingEnergy/022393
- ☑ Energy Cylce: http://www.ausgrid.com.au/Common/Education/Primary-school-electricity-resource/Interactive-learning/~/media/Flash/Education/Lesson%20One/Lesson1Energycyclediagram.ashx
- ☑ Sustainability - it's our future http://www.sustainingourtowns.org.au/resources/sustainable-living/
- ☑ Australian Sustainable Schools Initiative ACT - http://www.sustainableschools.act.gov.au/energy
- ☑ Calculate your appliance running costs - http://www.sa.gov.au/topics/water-energy-and-environment/energy/saving-energy-at-home/check-and-reduce-your-energy-use/appliance-running-costs
- ☑ Australian Renewal Energy Plants map: http://www.ga.gov.au/renewable/map.php?type=operating
- ☑ Sustainable schools activity - http://sustainableschools.org/documents/Sustainability%20for%20kids%20070302.pdf
- ☑ Splash ABC Renewable energy Game: http://splash.abc.net.au/media/-/m/200390/renewable-energies
- ☑ Science NetLinks (2014) download game: http://sciencenetlinks.com/media/filer/2011/10/07/powerup.swf

Games

- ☑ Online Stories: http://www.envirostories.com.au/stories/ (Lesson 1 & English lessons).
- ☑ Energy Quest interactive information & games http://energyquest.ca.gov/index.html

- ☑ Interactive Games - http://www.alliantenergykids.com/FunandGames/OnlineGames/KIDS_GAME_POWER_CHECK
- ☑ Energy Flow Quiz - http://www.sciencemuseum.org.uk/on-line/energy/site/QuizInteractive1.asp

Resources to be used in class

- ☑ Interactive map, scribble maps - http://www.scribblemaps.com
- ☑ Mind map: - https://www.mindmeister.com

Cross-curriculum learning

Sustainability : Protection of the environment and how to improve the schools' sustainability, in order to maintain a healthy life in the future.
OI.9 Sustainable futures result from actions designed to preserve and/or restore the quality and uniqueness of environments.

Geography: Identifying areas of in Australia that are renewable energy rich and why?
Develop geographical questions to investigate and plan an inquiry (ACHGS040).

Science: Investigating the variety of sources that generate electricity.
Science as a Human Endeavour: Identify the variety of sources available to produce electricity and ways to use energy effectively.
Energy from a variety of sources can be used to generate electricity (ACSSU219).

Maths: Students are to calculate and construct the school model to scale. Measurement and Geometry, Solve problems involving the comparison of lengths and areas using appropriate units (ACMMG137).

English: Students are to create their own story book using digital technology. The book is to entertain and persuade the target audience the importance of sustainability.
- Use a range of software, including word processing programs, learning new functions as required to create texts (ACELY1717)
- Participate in and contribute to discussions, clarifying and interrogating ideas, developing and supporting arguments, sharing and evaluating information, experiences and opinions (ACELY1709).
- Use comprehension strategies to interpret and analyse information and ideas, comparing content from a variety of textual sources including media and digital texts (ACELY1713)

Media Art: Using knowledge attained students are to create a digital story which includes text and images to support it. Sound and music may be added.
Explore representations, characterisations and points of view of people in their community, including themselves, using settings, ideas, story principles and genre conventions in images, sounds and text (ACAMAM062).

Visual Art: Planning and creating the model of a sustainable school. This model is created to influence the audience. Plan the display of artworks to enhance their meaning for an audience (ACAVAM116)

Theme: How can we improve our school environment to be more sustainable

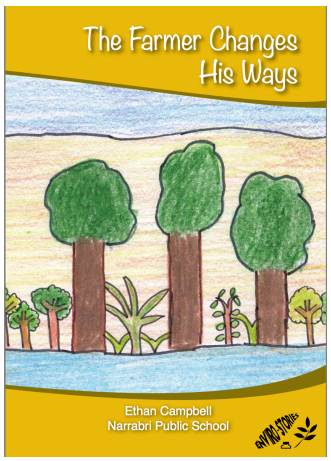
Students are to be set up into 6 groups. Each group to have 4 members. A group account will be set up in Edmodo for each group to submit their group work. Group names: Greenhouse, Carbon, Climate, Emissions, Energy and Electricity. Students will be placed into mixed ability groups to promote peer collaboration and learning. Students will be explicitly advised that each group member will be assessed on their collaboration and equal distribution of work. This is to encourage all student to have equal participation and positive group collaboration. Student personalities and abilities will be considered when organising the groups.

Lesson 1

Students' Prior Knowledge:
* Understanding of Electricity is required to provide power.
* Understanding of the process of solar energy.
* In science students learnt about what renewable and non-renewable resources are.
* Students have previously set up their mindmeister accounts.
* Students have pre-determined groups and partners allocated.
*

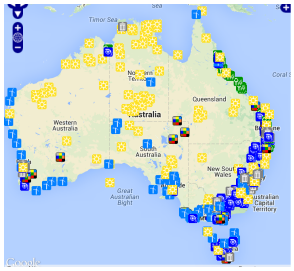
Focus Questions:
* What is an energy source?
* What do we mean by making our school more energy efficient?
* What are some of the things we have already in place?
* Why do you think the student, Ethan Campbell wrote this book?
* How can we alter our learning environment to decrease electricity consumption?
* How can we improve our school sustainability?
* What sources are energy efficient?
* How do we use electricity in our school?
* How could we use our electricity more wisely?
* How can we alter our learning environment to decrease electricity consumption?
* How can we improve our school sustainability?
* What would you do to make our school more energy efficient?

1.1 Read on IWB to students



1.2 Explain to the students the summative **Rich task**: In a group with 4 students, they are to design and create a model of the school to improve its sustainability. The model is to be at 1:200 centimetre scale Students are to include an individual report (typed) on, changes they would implement and why it is important to increase the schools' sustainability. These models and reports will be proposed to the school administration staff to discuss the implementation of possible changes to the school environment. In your report, mention, ways you could involve the wider community to be a part of your sustainability proposal.

1.3 Show students renewal energy map of Australia
http://www.ga.gov.au/renewable/map.php?type=operating

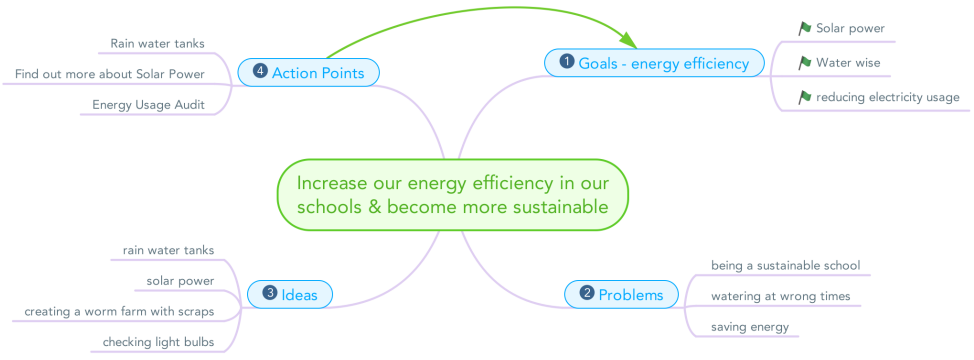


1.4 Think-pair-share

Using the information students have learnt during science and using Appendix 1, students working in a partnership are to create a mind map, using mindmeister. The heading is : "Ways to improve energy efficiency and sustainability in our schools."

Students are supplied with a list of relevant internet research sites to use (see Appendix 1).

Teacher Mind Map example



1.5 Students share ideas with their class. Mind maps are to be continuously updated by the students during their own learning journey.

1.6 Students in their Design group of 4 members are to research and refine ways to improve the school's sustainability and energy efficiency?
Students are to complete this plan during their science lesson. Plans are to be submitted via Edmodo before the next Technology lesson.

Group Name	**Group Members**
Energy Efficient and Sustainable School Research Sheet	
How do we use electricity in our school?	
Could the school use additional type of energy source rather than just coal or gas? If so what and how?	
What are simple ways to reduce energy consumption?	
What is the school doing already for sustainability (e.g.. Veggie garden, planting trees)?	
How could we improve our sustainability in our school?	

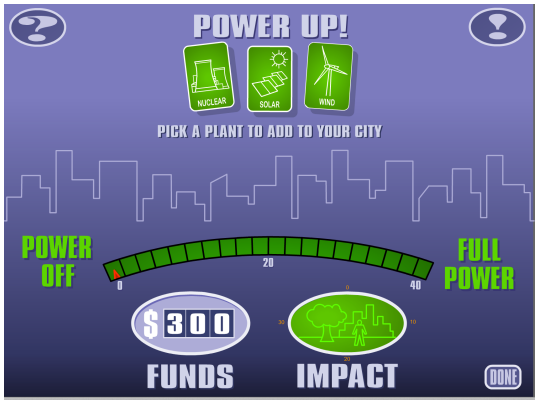
What do we need to do next?	

Lesson 2

Students' Prior Knowledge:
* During science students have conducted an energy audit on the school.
* During science students have completed their groups Energy efficient and Sustainable school research sheet plan (lesson 1).
* Students have previously set up their scribble map accounts and have limited experience.
* During Maths students have practised & understand the school model scale of 1:200 cm.

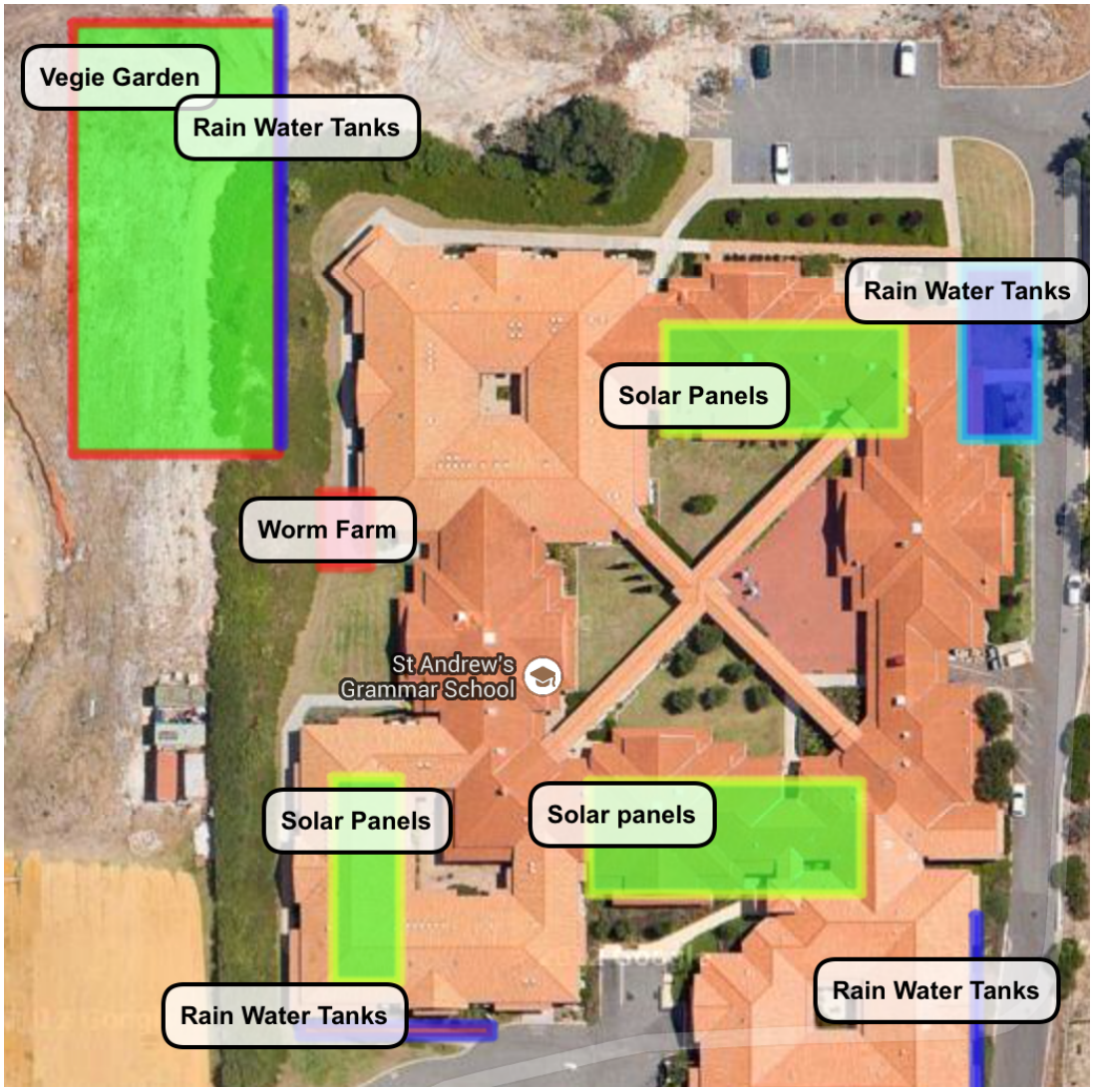
Focus Questions:
* In your science investigation what did you discover on your energy audit?
* How could our school implement renewable energy?
* What type of renewable energy do we have in Western Australia?
* What kind of renewable energy could we use in our school and how?
* How could we use our electricity more wisely?
* How can we alter our learning environment to decrease electricity consumption?
* What natural resources could we utilise?
* Where would you position the rain water tanks?
* Is where the veggie garden located an ideal spot?
* Should we consider solar panels?
* What materials will you need to construct your model?
* Where would you need to get these materials?
* Could you use something else that is more readily available?
* Is it reusable?

2.1 Introduction: Whole class game on IWB.
Science NetLinks (2014) download game: http://sciencenetlinks.com/media/filer/2011/10/07/powerup.swf
The game is about building up a city with the right combination of power plants to provide enough power.



2.2 Teacher to provide classroom feedback on student's 1.6 "Energy Efficient and sustainable school research sheet" plan. Teacher to read out a few groups answers.

2.3 In student groups using Scribble maps prepare a plan of the proposed sustainable school. Teacher school plan sample: http://www.scribblemaps.com/maps/view/1DKQ6hg0S8. Students are to collaborate their ideas to create this plan. Submit this to the teacher via Edmodo.



2.4 Planning of the school model 1:200 cm scale - Using the Map, this form is to be completed by the group. Design to assist in the planning of creating the school model. To be submitted to teacher before next lesson.

Group Name	**Group Members**	
Sustainable School Model		
Task	Materials required	Group member Responsible
Has each task been shared equally between each team member?	❒	
Do you have all the resources needed to complete the model?	❒	
Do you need to allow additional time for a team meeting to discuss and create your model?	❒	
Have you addressed all areas outlined in the rubric?	❒	

2.5 Students are to organise all their material required for their model.

Samples of constructed schools

(Lidcombe College TAFE, 2008)

Lesson 3

Students' Prior Knowledge**:**

* Students have completed their groups' "Sustainable School Model" plan.
* Students during science have worked out their homes greenhouse gas emissions using the online http://www.epa.vic.gov.au/agc/home.html - Australian Greenhouse emissions calculator.

Focus Questions:

* Does everyone feel they are on task?
* Does everyone know what they are doing?
* How would the future students and wider community benefit from a more sustainable school?
* Why would the future students benefit from a more sustainable school?
* Why is a sustainable school important to our community?
* How could we use our electricity more wisely?
* How can we alter our learning environment to decrease electricity consumption?

3.1 Whole class Game on IWB: This informative game provides information on energy consumption while providing a quiz. The game asks questions about reducing energy in the house, this makes the energy usage meter go down.

3.2 Sustainability & Energy Efficiency Report Plan form is design to assist each student with the submission of their written report.

Group Name	**Student Name**
Sustainability & Energy Efficiency Report Plan	
How does the school currently use electrical energy?	
What areas of the school need improvement?	
Why?	
How would you change it?	

What equipment would the school need?	
How would the community and the students in the future benefit from these changes	
Write a summary of your proposal:	

Lesson 4

Prior Knowledge: During Maths, students are to calculate their scale for their model and apply it to each area in centimetres, e.g., size of the oval, office, classroom , etc..

Focus Questions:
* Does everyone feel they are on task?
* Why would the future students benefit from a more sustainable school?
* Tell me who are the target audience is?
* What does our report need to communicate?
* Do you have all the materials ready?
* How could we use our electricity more wisely?
* How can we alter our learning environment to decrease electricity consumption?
* What is something you really like about this plan?
* Have you organised your materials needed for your school model?
* How is everybody travelling with their model?

4.1 Review lesson 3, Sustainability & Energy Efficiency Report Plan - provide positive feedback to students during a classroom discussion. Negative feedback to be done privately.

4.2 Provide a brief explanation on the marking rubric to the whole class - marking rubric is available on Edmodo and students are able to assess at any time.

Student Name			Date	
Marking Rubric - Technology (Digital & Design)				
Sustainability & Energy Efficiency Report				
Mark score	**3**	**2**	**1**	**0**
Explain how electrical energy is currently utilised. (ACTDEK020)	Provides an accurate of the school use of electrical energy.	Mentions 4 - 6 electrical energy use around the school.	Mentions 3 or less electrical energy used.	Fails to identify any electrical energy used.
Identifies area of school sustainability improvement (ACTDEP027)	Clearly identifies 5 or more areas the school requires sustainability improvement.	Identifies 3 or 4 areas the school requires sustainability improvement.	Identifies 1 or 2 areas the school requires sustainability improvement.	Fails to identify areas the school requires sustainability improvement.
Demonstrates reasoning on why the school would benefit from these changes. (ACTDEP027)	Provides a detail explanation outlining the benefits by implementing the proposed changes.	Provides a brief explanation on all of the points identified for the benefits to change the schools energy consumption and sustainability.	Provides a brief explanation on some of the points identified for the benefits to change the schools energy consumption and sustainability.	Provides no information.
Explanation of how to implement these changes. (ACTDEP024)	Provides a detail explanation outlining the procedure to implement the proposed changes.	Provides a brief explanation on all of the points identified outlining the procedure to implement the proposed changes.	Provides a brief explanation on some of the points outlining the procedure to implement the proposed changes.	Provides no information.
Explanation on equipment the school would need to implement these changes. (ACTDEP027)	Provides a detail explanation outlining the equipment the school would need to implement these proposed changes.	Provides a brief explanation on all of the points identified outlining the equipment the school would need to implement these proposed changes.	Provides a brief explanation on some of the points outlining the equipment the school would need to implement these proposed changes.	Provides no information.
Explains how the community and the future students would benefit from a more sustainable school. (ACTDEK019)	Describes in detail how the current community and future students would benefit from a more sustainable school.	Briefly explains how both the future students and current community would benefit from a more sustainable school.	Provides information on either the current community or future student benefits of a more sustainable school.	Failed to identify any benefits students from the future or the current community would benefit from a more sustainable school.

Sustainability & Energy Efficiency School Model

Planning (ACTDEP028)	Clear and precise evidence of planning, outlining, materials needed, school map and checklist completed.	Evidence of planning outlining most of the resources needed, a detail map of the school or checklist completed	Limited evidence of planning.	No Planning
Realistic Energy Sources and school sustainability modifications. (ACTDEK019)	All energy sources and proposed 4 or more sustainability modification are realistic to school needs.	Designed all energy sources and 2 or more sustainability modification realistic to school needs.	Has proposed most realistic sources and at least 1 achievable school modification.	Has not proposed any realistic sources.
Is the model to scale 1:200 cm and represents the school. (ACTDEP024)	Constructed a clear representation of the school to scale (approx. or more 80% accurate).	Has demonstrated understanding and created a model representation of the school not to scale.	Has limited understanding or demonstration of scale representation.	no at all to scale
Does the material used represent the item on the model (ACTDEP024)	All resources and materials used for the model have been selected appropriately to provide a clear representation of the item.	Some resources and materials used for the model could have been selected differently.	Most of the resources and materials used for the model could have been selected differently.	All Materials used could have been replaced with other materials. No clear consideration for representation of the school buildings or grounds were considered.
Collaboration / Communication (ACTDIP022)	Consistently worked well with their group members. Work was evenly split. Evidence on edmodo.	Often worked well with their group members. Work was spread evenly amongst team members. Evidence on edmodo.	Team was unable to cooperate most of the time. Work was uneven distributed.	Did not work well and was unable to distribute work fairly in the team.

4.3 Students are to begin their report using this plan. Students are to submit this plan to the teacher at the end of the lesson.

Student Nam:	**Due date: in two weeks**
Report Plan	
Introduction - A thesis statement outline why we need sustainability **May use subheading**	

Body - Suggest areas the school may improve.	
Conclusion - Offer solutions	

4.4 Students are to begin their group construction model. Students are to work on their models during Visual Arts. This project is part of the student's Visual Art assessment (ACAVAM116).

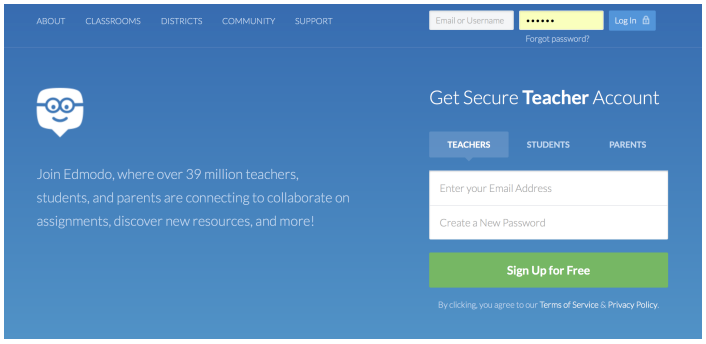
Lesson 5

Prior Knowledge:
During Visual Art, students have worked on their models.
During Maths, students are to calculate their scale for their model and apply it to each area required in centimetres, e.g., size of the oval, office, classroom , etc..

Focus Questions:
* Does everyone feel they are on task?
* Does anyone have any questions regarding their report?
* What is something you will always remember from this learning experience?

5.1 Students are to finish off their models and report. Reports may be finished off at home and turned in via Edmodo in one week.

Students are to use Edmodo to discuss their meeting times and any relevant assignment information.



5.2 Students Reflection. Students are to fill the reflection form.

Student Name:	**Date**
Student Reflection: DTM Sustainability for our school	
What did find interesting?	
What did you like?	
What would you change if you did it again?	
What went well?	

Finished model product.

DTM: Sustainability for our school Learning Outline			
	Learning goals	**Questions**	**Curriculum Link**
Lesson 1	Identify at least 3 areas the school may improve to become more energy efficient	What is an energy source? What sources are energy efficient? What do we mean by making our school more energy efficient? What are some of the things we have already in place? How do we use electricity in our school? How could we use our electricity more wisely? Main focus questions: How can we alter our learning environment to decrease electricity consumption? How can we improve our school sustainability?	* D & T (ACTDEK019). Cross-curriculum: * Sustainability QI.9. * Science (ACSSU219). * Geography (ACHGS040)
	Assessable Activity:Think-pair-share. In pairs construct a mind map & then share with the class.		
Lesson 2	Student using scribble maps are to create a proposed sustainable school. Map must include at least one type of both sustainable and energy adjustment.	* In your science investigation what did you discover on your energy audit? * What type of renewable energy do we have in Western Australia? * How could our school implement renewable energy?	D & T (ACTDEP028) Cross-curriculum: * Sustainability QI.9. * Science (ACSSU219). * Maths (ACMMG137). * Geography (ACHGS040)
	Assessable Activity: * Group scribble map to be sent to the teacher via Edmodo. * Energy efficient and Sustainable school research sheet plan via Edmodo		
Lesson 3	Students are to complete their individual “Sustainability and efficiency report plan.”	* How does are school consume electrical energy? * What were area you discovered the school needs to improve in order to reduce electrical energy usage?	D & T (ACTDEK019), (ACTDEP024), (ACTDEP027) & (ACTIP022) Cross-curriculum: * Sustainability QI.9. * Science (ACSSU219). * English - (ACELY1709)
	Assessable Activity: Students are to complete their individual “Sustainability & Energy Efficiency Report Plan” and submit it via Edmodo by the end of the lesson.		

Lesson 4	* *Start on the construction of their group model.* * *Mostly complete their report plan.*	Do you have all the materials ready? Tell me who are target audience is? What does our report need to communicate?	D & T (ACTDEP024), (ACTDEP027) & (ACTIP022) Cross-curriculum: * Science (ACSSU219) * Maths (ACMMG137. * English - (ACELY1709), (ACELY1717), (ACELY1713). * Sustainability QI.9. * Visual Art (ACAVAM116)
	Assessable Activity: Students are to be assessed on the information and understanding provided in student's individual report plan.		
Lesson 5	* *Mostly finish the construction of their group model.* * *Complete their learning DTM journey reflection.*	What is something you will always remember from this learning experience?	D & T (ACTDEK019), (ACTDEP024), (ACTDEP027) & (ACTIP022) Cross-curriculum: * Sustainability QI.9. * Science (ACSSU219). * Visual Art (ACAVAM116). * Maths (ACMMG137).
	Assessable Activity: Students are to be assessed on their reflection and model progress.		

References

Australian Curriculum, Assessment and Reporting Authority, (ACARA). (20 14). *Australian Curriculum, Technology, Year 6*. Retrieved from:http://www.australiancurriculum.edu.au/technologies/design-and-technologies/Curriculum/F-10?layout=1#level5-6

CSIRO. (n.d.). *CarbonKids Educational Resources.* Retrieved September 3, 2014, from http://www.csiro.au/Portals/Education/Teachers/Classroom-activities/CarbonKids/CarbonKids-Resource.aspx#aCKEdRes

NSW Government. (n.d.). *Eduction & Communities: Ecospace*. Retrieved September 4, 2014, from https://schoolsequella.det.nsw.edu.au/file/2e3ae78a-7de8-4f12-ada0-cc587662e966/1/14316.zip/lo/13989/13989.htm

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Appendix 1

Students Online Resources

Research Internet sites that may be used:

1. Energy Quest http://energyquest.ca.gov/index.html
2. Your carbon diet (energy consumption and efficiency of products in our environment, e.g., washing machine and cars) http://www.pbs.org/wgbh/warming/carbon/playalready.html
3. Kids Korner Energy Education is fun - http://www.fplsafetyworld.com/?ver=kkblue&utilid=fplforkids&id=16160
4. TVA Kids - http://www.tvakids.com/cfl.htm
5. Alliant Energy - http://www.alliantenergykids.com/EnergyandTheEnvironment/SavingEnergy/022393
6. Energy Cylce: http://www.ausgrid.com.au/Common/Education/Primary-school-electricity-resource/Interactive-learning/~/media/Flash/Education/Lesson%20One/Lesson1Energycyclediagram.ashx
7. Sustainability - it's our future http://www.sustainingourtowns.org.au/resources/sustainable-living/
8. Australian Sustainable Schools Initiative ACT - http://www.sustainableschools.act.gov.au/energy
9. Calculate your appliance running costs - http://www.sa.gov.au/topics/water-energy-and-environment/energy/saving-energy-at-home/check-and-reduce-your-energy-use/appliance-running-costs
10. Australian Renewal Energy Plants map: http://www.ga.gov.au/renewable/map.php?type=operating
11. Sustainable schools activity - http://sustainableschools.org/documents/Sustainability%20for%20kids%20070302.pdf
12. Splash ABC Renewable energy Game: http://splash.abc.net.au/media/-/m/200390/renewable-energies
13. Science NetLinks (2014) download game: http://sciencenetlinks.com/media/filer/2011/10/07/powerup.swf

Games

14. Online Stories: http://www.envirostories.com.au/stories/ (Lesson 1 & English lessons).
15. Energy Quest interactive information & games http://energyquest.ca.gov/index.html
16. Interactive Games - http://www.alliantenergykids.com/FunandGames/OnlineGames/KIDS_GAME_POWER_CHECK
17. Energy Flow Quiz - http://www.sciencemuseum.org.uk/on-line/energy/site/QuizInteractive1.asp
18. Ollie's Game - Energy saving games. http://www.ollierecycles.com/club/gamehouse.htm

Resources to be used in class

19. Interactive map, scribble maps - http://www.scribblemaps.com
20. Mind map: - https://www.mindmeister.com

Appendix 2

DTM - Sustainability for the school

Teacher Materials Supplied for Group School Model

- ☑ 60 x 70 cm board per partner
- ☑ cardboard boxes
- ☑ jar lids
- ☑ paper towel/toilet rolls
- ☑ pop-sticks
- ☑ glue
- ☑ foil
- ☑ foam boards
- ☑ pieces of scrap rubber, bottle caps and fly screen
- ☑ Glue - PVA, Spray adhesive and hot glue
- ☑ Corrugated card and natural sea sponges
- ☑ Lego
- ☑ Feathers
- ☑ tooth picks
- ☑ beads
- ☑ Metal rulers & craft desk mats
- ☑ Try-square, T-square or set-square
- ☑ Stanley knives