FOREST LEARNING

Teacher

Timber, a sustainable and Renewable Resource

Teacher Overview

Timber, a Sustainable and Renewable Resource.

The aim of this unit is for students to investigate how and why wood is considered to be a sustainable and renewable resource. Students will be able to identify the properties of wood that make it a versatile material and determine products that are made from wood. The investigations will be centred around the concept of **sustainability.**

There are multiple activities to use in this lesson for cross-curricular outcomes. You may choose to undertake all of them, or alternatively, choose those relevant to the objective you wish to achieve.

Learning Objectives

Students will be able to identify:

Renewable and non-renewable resources.

- The difference between human made and natural products.
- How adaptable is wood and why.
- How people can promote sustainability by using wood products.

Context and Rationale

This unit progresses over four stages:

The first stage is based in research and gathering background knowledge. This also is used to establish pre-existing background knowledge and to ensure that there is a level understanding among the students, before the investigations begin.

The second stage consists of first hand investigations into the properties and adaptability of wood.

The third stage encourages students to elaborate on their knowledge of renewable resources by making connections about why wood is a sustainable resource.

The culmination stage provides students with the opportunity to reflect on their learning. Designing an artwork to visually represent their results and attitudes about using wood as a sustainable and renewable resource, in contrast to human made materials.

Inquiry Framework Overview

The 5E Inquiry Approach

Forest Learning has selected the 5E Inquiry approach to inform the teaching methodology behind this unit. The 5E instructional model has been used since the late 1980s to inform quality investigative Science based units. It is a constructivist teaching model which enables students to create and build their own learning pathways by encouraging the exploration of

new experiences and ideas. A pedagogical shift from traditional Science teaching methods is observed in this framework as the emphasis is on teacher facilitation of a unit where students have opportunities to construct their own key conceptual understandings. Forest Learning is committed to the creation of units which can be used to engage students in open-ended, student-centered and hands-on activities.

This unit also provides opportunities for students to participate in 'science as practice'. According to Harris & Rooks (2010) this involves being able to:

1. Know, use and interpret scientific explanations
2. Generate and evaluate scientific evidence and explanations
3. Understand the nature and development of scientific knowledge
4. Participate productively in scientific practices and discourse

The purpose of the five different phases are as follows (AAS, 2008a):

Engage

- Create interest and stimulate curiosity
- Set learning within a meaningful context
- Raise questions for inquiry
- Reveal students' ideas and beliefs, compare students' ideas

Explore

- Provide experience of the phenomenon or concept
- Explore and inquire into students' questions and test their ideas
- Investigate and solve problems

Explain

- Introduce conceptual tools that can be used to interpret the evidence and construct explanations of the phenomenon
- Construct multi-modal explanations and justify claims in terms of the evidence gathered
- Compare explanations generated by different students/groups
- Consider current scientific explanations

Elaborate

- Use and apply concepts and explanations in new contexts to test their general

applicability
- Reconstruct and extend explanations and understanding using and integrating different modes, such as written language, diagrammatic and graphic modes, and mathematics

Evaluate

- Provide an opportunity for students to review and reflect on their own learning and new understanding and skills
- Provide evidence for changes to students' understanding, beliefs and skills

Timber, a Sustainable and Renewable Resource		
5E	**Lesson**	**Content**
Engage	**1**	What are the differences between renewable and non-renewable resources?
Explore	**2**	What are the differences between human made and natural products?
	3	What are the properties of wood?
Explain	**4**	How do wood products transition from seed to final product?
	5	Which material is the most useful without excessive manufacturing?
Elaborate	**6**	Why is wood a sustainable resource?
	7	How is wood used in art?
Evaluate	**8**	Art lesson, reflecting on learning

Sequence of Learning		
Lesson	**Lesson Title, purpose and overview**	**Preparation/ Resources**
Lesson 1	**Engage – Stage 1** **What is the difference between renewable and non-renewable resources?** **Research and gathering background information**	

	Renewable Resources Renewable resources are replenished by the environment over relatively short periods of time. Examples of renewable resources include: • Solar and wind energy • Plants: Trees used for timber, cotton used for clothes and food crops (such as corn and wheat) can all be replanted and regrown after they have been harvested • Animals: Other than endangered and threatened species, are also considered a renewable resource as they can be bred to create supply • Water: Although there is a limited supply of fresh water, it can be replenished All of these renewable resources still need to be managed to maintain the balance of how much we use against how much is made. This is our responsibility as human consumers on Earth. Non-Renewable Resources Non-renewable resources are resources that cannot be replenished at a rate equal to the rate at which we use it. Examples of non-renewable resources include: • Fossil fuels: crude oil, natural gas, coal, oil shales and tar sands. We use these to make energy such as heat and electricity and to drive our cars. They are considered non-renewable resources because the Earth cannot regenerate them within a useable timeframe; there are finite resources of fossil fuels on the planet. 1. Create interest and stimulate curiosity by displaying raising the inquiry question on the interactive whiteboard 'What are renewable and non-renewable resources?' As a class, watch the video "Wood as a renewable and energy efficient resource" on the interactive whiteboard to introduce the definition of renewable and non-renewable resources. 2. Explain to the class that they are going to investigate the meaning behind each and record a definition in their own words. They must also find examples of renewable and non-renewable resources, encourage them to think about the items they have at home or in their daily lives to set the learning in a meaningful context. Allow students to do this	http://forestlearning.edu.au/find-a-resource/article/27/wood-as-a-renewable-and-energy-efficient-resource.html Interactive whiteboard 1x Science Journal per student (either a paper copy or use a great online tool such as penzu.com) Class set of tablets (such as iPods) or computers

	in either a paper science journal or an online tool such as Penzu. Explain that this journal will be used over the course of the unit to record all of the students' research, investigations and findings. 3. Divide the class into small groups and use the tablets or computers to research their answers, recording their answers in their science journal. 4. Regroup and discuss the findings, revealing students' ideas and beliefs. Compare any similarities and differences the students have and refine any definitions as required. 5. As a class, view the Forest Learning video *'Wood as a Renewable and Energy Efficient Resource'* explaining the differences between renewable and non-renewable resources and how wood is an energy efficient renewable resource. 6. To conclude the lesson, students again regroup to test their knowledge of renewable and non-renewable resources by playing the Children's University interactive game *'Renewable and Non-Renewable Energy'*.	Forest Learning video '*Wood as a Renewable and Energy Efficient Resource'* http://forestlearning.edu.au/find-a-resource/article/27/wood-as-a-renewable-and-energy-efficient-resource.html Children's University interactive game *'Renewable and Non-Renewable Energy'*. http://www.childrensuniversity.manchester.ac.uk/interactives/science/energy/renewable/
Lesson 2	**Explore – Stage 2** **What is the difference between human made and natural products?** 1. Pose the question 'Why are some products considered to be human made if they originally come from natural resources?' Discuss as a class and develop a class definition of 'natural resource' and 'human made resource'. 2. Display a range of items made from different materials. For example: • Wool = socks • Plastic = toy • Rubber = wheel • Wood = bowl	Socks Children's plastic toy Bicycle or equivalent rubber wheel Wooden bowl Drinking glass Leather jacket Cotton pillowcase Clay ornament Interactive whiteboard

- Glass = drinking glass
- Leather = jacket
- Cotton = pillowcase
- Clay = ornament etc.

Using the interactive whiteboard, as a class brainstorm a list of possible materials that the products could be made from then allow the students to examine the items. Ask them to determine which materials they think each item is made from, listing answers in their journals.

Science journals

Tablets/computers

3. Divide the class into small groups to participate in a product scavenger hunt to provide experience of the human made versus natural materials concept. The aim of the hunt is for the students to locate a diverse array of items made from different products in order to create a comparison table.

4. Remaining in their groups, ask students to identify which products are considered "natural" and which products have undergone excessive manufacturing and chemical processes and are considered to be "human made" resources. Explain that natural materials are those that come from plants, animals, and minerals. Human made materials are produced from naturals products but have gone through complex manufacturing processes. Allow the students time to use the internet to research their materials, determining if they are natural or human made. They should record their findings in a format of their choice such as:

Natural Products		
Source	Natural Material	Product
Plants	Wood	Box, table
	Cotton	Cotton ball, t-shirt
	Rubber	Balloon, elastic banc
Animals	Leather	Shoe, handbag
	Wool	Jumper, gloves
	Silk	Scarf
	Fur	Hat
A combination of clay minerals and metal oxides found naturally on earth	clay	Vase, brick

	Human Made Products	
Source	Type	Product
Oil (+additives)	PVC	Plastic pipe
	Styrofoam	Coffee cup
	Polyester	Car seatbelt
	Nylon	Toothbrush bristles
Sand, soda ash, limestone	Glass	Window
Minerals	Metal	Spoon, coins

5. Ask students how they could sort the natural and human made products into different categories to those listed in their table. Are there any similarities or differences? They must record this information in their science journals. Explore and inquire into students' questions and test their ideas by challenging the categories they produce. Ask students to explain why they have grouped items into their chosen categories.

6. As a class, walk around the school grounds and investigate natural and human made products. Using their science journals, students create tally scorecard of the products that they identify.

7. Return to the classroom and ask students to share their tally results to discover which products are used most often.

Lesson 3

Explore – Stage 2 continued

First Hand Investigation

How adaptable is wood?

1. Recording in their journals, allow the students time to brainstorm items that are made from wood. Ask students to read out some of their answers, drawing attention to how exhaustive the list is. Explore and inquire into any questions

Science journals

Virginia Tech website *'Wood*

	the students may have, then provide opportunities in the following investigation for students to test their ideas. 2. Display the *'Wood Magic'* website on the interactive whiteboard. As a class, navigate through the site to discover how many products in our homes are made form wood. 3. Display the page:http://www.forestlearning.edu.au/australian-forests/wood-production-process on the interactive whiteboard. As a class read through the parts of a tree that we use to produce different products. 4. Explain to the class that just as there are many types of wood available and used for many different purposes. Display a list of different uses for wood on the interactive whiteboard. Example: Building housing frames, carving, bed frame, outdoor furniture, boat, lightweight model plane, paper. Ask students to study the list an think of properties that may be important for each use. Example: Boat – need to float , outdoor furniture – heat resistant, not hold too much water. Carving wood: soft and workable. 5. **Properties of Wood Experiment** Students will conduct a first hand investigation to test the properties of wood. Discuss with the class how to conduct an experiment, noting the key features to include: • Aim • Equipment • Prediction (hypothesis) • Variables • Method • Results As a class write a plan for the experiment using the headings Aim, Prediction, Method and Results. <u>Aim</u> To test the properties of wood to determine their suitability for their use.	*Magic'* http://woodmagic.vt.edu/Kids/daily/index.htm Off-cuts of wood from local hardware store (pine, redgum, black butt, MDF and balsa wood) Plastic tub with water Hammer Sandpaper (fine and course) Heater or hairdryer Timer Scales

		As a class, ask students to suggest how the aim could be phrased as a question. Display the question on the interactive whiteboard and ask students to write the aim in their science journals. <u>Equipment</u> 20cm x 10cm off-cuts of wood (pine, redgum, black butt, MDF and balsa wood) Plastic tub with water Hammer Sandpaper (fine and course) Heater or hairdryer Timer Scales <u>Prediction/Hypothesis</u> Students need to record the predictions they have about the results of this experiment. For example, they might write about which type of wood is the most sturdy and which type is most frail. Discuss predictions and reasoning amongst the class then allow time for the students to write the prediction/s into their science journals. <u>Variables</u> Explain that in any valid investigation, certain factors need to control the experiment and remain the same whereas some need to alter in order to determine the findings. Allow the students to determine the factors/variables in their investigation they wish to remain the same (the control) versus those they wish to change. <u>Method</u> As a class, create an equipment list and write a procedure providing detailed instructions about how the students are going to conduct the experiment. This can be jointly constructed using the interactive whiteboard. 1. Touch each type of wood and describe how it feels. 2. Agree upon the variables in the experiment and identify the controls.	Interactive whiteboard Different types of wood Sandpaper (varying grades of fine to course) Hammer Bucket and water Heater or hairdryer Timer Scales

3. Using a hammer, pound each piece of wood and examine the indent left by the hammer to determine how hard or soft the wood is.
4. Weigh each piece of dry wood then submerge the wood into the water filled tub for 3 minutes. Weigh it again to determine how much water has been absorbed.
5. Sand each piece of wood and observe how easy or difficult it is to smooth/roughen the surface.
6. Place each piece of wood in front of a heater or under a hair dryer for 3 minutes. Feel the wood after one minute intervals to see how long it retains the heat.
7. Place the wood in a bucket of water. Does it sink or float?

Results:

Students need to clearly articulate the findings of this investigation. Specifically, they need to ask themselves:

1. What did I find out?
2. How does this relate to my prediction?
3. Why did this happen?

Students create a table in their science journals to collate their results. For example:

Pine	Blackbutt	Red Gum	Balsa
____ mm	_____ mm	_____ mm	_____ mm
Weight before: Weight after:	Weight before: Weight after:	Weight before: Weight after:	Weight before: Weight after
Smooth: Course:	Smooth: Course:	Smooth: Course:	Smooth: Course
After 1 min: After 2 min: After 3 min:	After 1 min: After 2 min: After 3 min:	After 1 min: After 2 min: After 3 min:	After 1 min: After 2 min: After 3 min:

	5. To conclude, regroup as a class and use the investigation results to determine which wood type is best used for building, carving, vessel (boat), outdoor furniture, lightweight model plane, paper, indoor furniture, chopping boards and other uses suggested by the students.	
Lesson 4	**Explain - Stage 3** **How do wood products transition from seed to final product?** 1. Explain to the students that this task will involve researching and explaining a system or process that wood transitions through in each stage of production to create a commodity. Discuss terminology and definitions. Students select one wood product that interests them and researches in detail the stages of production from seed to final product, considering current scientific explanations. Examples of products may include: Paper, electricity poles, fencing, house frames, MDF, furniture etc. The Forest Learning website has many fantastic resources that can aid in the students' research. 2. Students use the Forest Learning website and other internet resources to research their product and record the production process into their science journal. If possible, encourage students to contact their local state forest authority, processing plants etc. to gather primary resources supporting their research. 3. Ask students to prepare a slide show presentation with images found in their research to detail the process of their product from seed to commodity. Students should prepare an oral presentation to accompany their slide show. Encourage students to think about how whether their chosen commodity reflects a beneficial need in the everyday lives of humans or if it is rather a consumer want (nice to have) by constructing multi-modal explanations and justifying their claims in terms of the evidence gathered. 4. As a class, view the presentations and ask students to share their thoughts on these processes and develop a list of	Tablets/computers Science journals Forest Learning website examples: *'Powerpoles'* http://forestlearning.edu.au/find-a-resource/article/26/going-bush-tracing-the-power-poles-back-to-north-east-tasmania-s-forests.html *'MDF'* http://forestlearning.edu.au/find-a-resource/article/24/innovation-in-manufactured-wood-products-and-construction.html *'Home Products'* http://forestlearning.edu.au/find-a-resource/article/29/timber-sleuth.html

	possible questions for future investigation. Compare explanations generated by the students to determine whether there is a class divide in opinion as to whether that particular product is of benefit to the wider population or a 'nice to have'.	
Lesson 5	**Explain - Stage 3 continued** **Which material is the most useful without excessive manufacturing?** 1. Using the interactive whiteboard display a definition of manufacturing. Manufacturing is the production of goods for use or sale, using labor and machines, tools, chemical and biological processing. In groups, ask students to create a flow chart or flow diagram to illustrate the steps in processing timer product (from tree harvesting to final product) and another to illustrate the steps involved in making a plastic product (from oil extraction to final product) 2. Introduce brainstorming and questioning as conceptual tools that can be used to interpret the evidence and construct explanations of a phenomenon. To illustrate the effectiveness of this tool, ask students to imagine that they have been given permission to design and build their dream classroom. The catch is that they can only choose one natural material to create the products, including the classroom itself. Ask students to brainstorm possible materials and make predictions about which product would have the most uses. 3. Set up 5 stations for student to work at in groups. Each station should include only 1 material for students to design a classroom. Divide the students into 5 groups, assigning each of the group one material only that they can use to design their classroom. Group 1: Clay Group 2: Wood (blocks, pop sticks, paper) Group 3: Cotton (Cotton wool, cotton fabric) Group 4: Steel (Aluminum foil, meccano) Group 5: Plastic (Lego, plastic bottles, straws)	Useful flow diagrams: http://sfc.jp/english/information/society/environment/images/fore_img01.jpg http://www.technologystudent.com/prddes1/oil4a.png Tablets/computers Science journal Clay, wood blocks, pop sticks, paper, cotton wool, cotton fabric, aluminium foil, meccano, Lego, plastic bottles, straws

	Once students have completed their designs, bring the class together to evaluate the usefulness of each material. 4. Download the Forest Learning App *'Timber Sleuth'* into students' tablets. Timber Sleuth aims to raise awareness to children about timber products in and around the home, that may not always be obvious, and to educate on the strength, durability and beauty of timber. Designed for pre and primary school children, it allows the player to be a timber sleuth – identifying wood products in the most unexpected places. Forest Learning. 5. Ask students to design a bedroom using only wood products. Students should draw and label each item in the room and create a list of the rooms' contents in their science journal. 6. Students must then develop a list of criteria/questions to self evaluate their designs. The purpose of the questions is for students to construct multi-modal explanations and justify their claims in terms of the evidence gathered. For example: • How do I know if it is practical/livable? • What evidence is there that this would be a comfortable space? • Is anything missing that would be required for my needs? 7. Students demonstrate their knowledge by creating a 3D model or diorama of their bedroom. They must represent the contents and design of the bedroom using natural wood materials or items made from wood such as pop sticks, cardboard, paper, matchsticks, MDF etc. Once completed, share as a class and evaluate their designs.	Forest Learning App *'Timber Sleuth'* http://forestlearning.edu.au/find-a-resource.html Natural wood or wood material construction items for a diorama. Cardboard box Glue Scissors
Lesson 6	**Elaboration – Stage 4** **Why is wood a sustainable resource?** 1. Display three definitions of *'sustainability'* on the interactive whiteboard and ask students to offer suggestions to refine and develop definition of their own. Example definitions:	

	• 'Development that meets the needs of the present without compromising the ability of the future generations to meet their own needs.' Brundtland Report 'Our Common Future' (1987) • '…leaving the world a better place than you found it, taking no more than you need, trying not to harm life or the environment and making amends if you do.' Paul Hawkens (2004) • '…an ability or capacity of something to be maintained or to sustain itself. It's about taking what we need to live now, without jeopardising the potential for people in the future to meet their needs. (landlearnnsw.org) The key idea for students to comprehend is that we must all act responsibly to ensure the resources on earth will be able to support future generations. Sustainable practices will enable humans to maintain the Earth's natural resources as they are continuously replenished. The degree of usage has a deep impact on natural resources, and ultimately the sustainability of our Earth. 2. As a class, discuss how wood fits into the category of being a sustainable resource. Students should implement the knowledge they have gained so far during the unit to apply concepts and explanations for how wood is sustainable product. 3. This lesson will engage the students in research to reconstruct and extend their explanations and understanding of wood as a sustainable resource. They will incorporate different modes such as written language, diagrammatic/graphics and mathematics to represent their findings. Begin the research process by conducting a class critical literacy activity. Display the webpage *'Products from Timber'* on the interactive whiteboard and read the information together. Ask students to summarise the information into their science journal then answer the following questions:	Website *'Products and Timber'* http://www.pir.sa.gov.au/__data/assets/pdf_file/0010/79840/Forestry_Matters_-_Fact_sheet_-_Products_from_timber.pdf Video *'Make it wood'* https://www.youtube.com/embed/WZUGgsGzWSw?autoplay=1&autohide=1&rel=0 Science journals

	• What is the topic? • What is its purpose? (What is its genre?) • To whom is it written? • Who may have authored it and what would their position be? • How does the language of the text help to achieve its purpose? • What other ways of writing about the topic are there? (Adapted from Rice 1998:56) 4. Watch the video *'Make it wood'* and ask the class to again summarise the key points in their science journals. Using the critical literacy questions from the previous activity, students' must convert the video's key messages into a written explanation text as to why wood is a sustainable resource. Their challenge is to consider the following points and build a text incorporating different modes such as written language, diagrammatic/graphics and mathematics whilst considering the intended audience and purpose. • Topic – Wood is a sustainable resource • Purpose – Inform readers about the benefits of wood in the context of sustainability • Audience – Their student peers • Language - How does their choice of language in their text help to deliver the key messages of the video? • Modes - What other ways of writing about the topic are there and how can they incorporate diagrams to illustrate their key messages? 5. Once completed, students must swap their writing with a partner and read carefully through the text, taking note of if the points listed above were adequately covered. After reviewing the information, students develop a series of questions that they would like answered whilst researching sustainable forestry. 6. Regroup as a class to discuss the students' questions and evaluate which would be best suited to ask a forester to better understand how timber is sustainably managed.	Visit/Skype/video conference from a park ranger or forester Webpage *'Forest Learning Links'* http://forestlearning.edu.au/links.html

	7. Organise for a visit, Skype chat or video conference with a forestry worker to discuss the importance of forest management. Select students to interview the forester by asking their pre-developed questions. Alternatively, students could write an email with their questions to their local state forest authority. To determine your nearest, use the *'Forest Learning Links'* webpage for further information.	
Lesson 7	**Elaboration – Stage 4 continued** **How is wood used in art?** 1. Explain to the students that not only is wood used for building and producing practical products, it can also be used for creating art and items of cultural significance, in both traditional and modern art styles. As a class, brainstorm different art forms the students have seen using wood. 2. Use and apply this knowledge in a new context to test the students' general understanding of the concept of wood as an art form. Using a pin board webtool such as the site *'Pinterest'*, teach the students how to search for existing boards and create their own, exhibiting art works and items of Aboriginal and Torres Strait Islander cultures, these may include: • Musical instruments (Didgeridoo, bimli sticks, rasp) • Hunting tools (boomerang, woomera, spears) • Sculptures • Bark painting • Carvings • Masks • Shields In addition to Aboriginal and Torres Strait Islander cultures students may wish to investigate other cultures and methods of creating art form wood. The following is a list of additional art forms that use wood. • Furniture • Wood turning	Tablets/computers Website *'Pinterest'* https://www.pinterest.com/ Internet access Items of wood to be used in the creation of an art form. Other materials required to create an artwork such as paint, adhesive, cutting tools etc.

	• Totem poles • Wood burning • Marquetry • Wood chip art • Wood burning 3. Once the students have created a basic pin board, ask them to choose from one of the above expressions, or a different one of their choosing. They will need to replicate a basic version of this artwork with their own creative flair. Encourage the students to use as many natural wooden resources as possible such as bark, wood chips, off cuts, rattan etc. Minimise the need to purchase wood from a local hardware store or timber yard by going on a gathering expedition to a local park or around the school grounds, but allow students to look around their homes for unused timber to be recycled for this project. 4. Allow students research and construction time both in class and for homework. The completion of their art form should be accompanied by a presentation detailing the following concepts of the wooden art form they chose: • Origin • History • Uses for the art form • Materials used in creation • Cultural significance • Famous examples • Why the art form has significance to them • How they constructed their piece • Where they plan to exhibit their piece e.g. home, garden, schoolyard etc. It is suggested that the students use digital photography to document the process of their creation. Combined with images on the web, an effective presentation can be given using a webtool such as *'Pinterest'* alone, or students could create a more formalised presentation using a tool such as *'Prezi' and 'PowerPoint'*. 5. Allow time for each student to display their artwork and give their accompanying presentation. As a reflection exercise, discuss the purpose behind the artwork and why	Website *'Prezi'* http://prezi.com/

	the students believe many artists use wood as their medium of choice. Consider the effects of sustainability in responses.	
Lesson 8	**Evaluate – Stage 5** **Reflection and Assessment of learning through Art** 1. Take students for a walk around the school grounds or local park to review the various plants and trees in their local community. Students record any new species recently planted into their science journals. 2. Upon return, provide an opportunity for students to document their thoughts about wood and its use as a material for humans. Brainstorm and record words and phrases that come to mind when they think about the terms 'wood'. Use the headings *'before'* (thinking about where wood comes from), *'now'* (outlining how timber is harvested and manufactured into wood products) and *'after'* (what happens to wood when it's no longer needed). 3. Repeat the exercise, this time considering items they can see in the classroom that are made from materials other then wood. Ask students to brainstorm and record words and phrases that come to mind when for those materials under the same headings. Ask students to share some of the words and phrases they have and receive feedback from their peers. 4. Using a webtool such as *'Wordle'* or '*Tagxedo'*, students create a reflection piece for assessment in the form of a word cloud. Two clouds should be created, one demonstrating the sustainability of wood and a contrasting cloud for representing the non-renewable nature of other materials. The form or shape of the word cloud should be at the student's discretion but needs to reflect their concept. For example a tree representing wood as a sustainable resource, a factory representing other materials that are non renewable.	Science journals Tablets/computers Website *'Wordle'* http://www.wordle.net/ Website '*Tagxedo'* *http://www.tagxedo.com*

5. Once students have generated a digital version of their word cloud, any art materials required for the students to visually represent their two contrasting word clouds. This could be done in the form of a painting, mural, collage etc. The word cloud diagrams built on the computer should form the plan of the final representation.

6. To conclude, provide an opportunity for students to review and reflect on their own learning and new understanding and skills by writing a self assessment piece of the learning they have constructed throughout the unit which is represented in their final artwork. Examples of questions to consider when evaluating:

   How does the artwork represent your attitude towards using wood as opposed to other resources?
   How does your design represent the impact of use of sustainable and unsustainable resources on the environment?
   What are some of the keywords or phrases used in your artwork that reflect your learning throughout the unit?
   What is the overall message that you are trying to convey through your visual representation?

Art materials such as:
paint
paper
scissors
glue

FOREST LEARNING

Teacher

National Curriculum Outcomes Assessment Rubric					
	Outstanding	**Excellent**	**Satisfactory**	**Basic**	**Developing**
Science Understanding ACSSU074	Comprehensive knowledge and understanding of concepts, facts and procedures involved in using the earth resources. Explains that some of Earth's resources are renewable, but others are non-renewable. Identifies that natural and processed materials have a range of physical properties and understands how these properties can influence their use.	Thorough knowledge and understanding of concepts, facts and procedures involved in using the earth resources. Explains that some of Earth's resources are renewable, but others are non-renewable. Identifies that natural and processed materials have a range of physical properties and understands how these properties can influence their use.	Satisfactory knowledge and understanding of concepts, facts and procedures involved in using the earth resources. Explains that some of Earth's resources are renewable, but others are non-renewable. Identifies that the physical properties of wood can influence its use.	Variable knowledge and understanding of concepts, facts and procedures involved in using the earth resources. Understands that some of Earth's resources are renewable, but others are non-renewable. Identifies that the physical properties of wood can influence its use.	Developing knowledge and understanding of concepts, facts and procedures involved in using the earth resources. Understands that some of Earth's resources are renewable, but others are non-renewable. Identifies that the physical properties of wood can influence its use.
Science as a Human Endeavour ACSHE050 ACSHE051 ACSHE061 ACSHE062	Comprehensive knowledge and understanding that science understanding influences the development of practices in areas of natural resource management and explains that science can influence the choices that people when	Thorough knowledge and understanding that science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource	Satisfactory knowledge and understanding that science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management.	Variable knowledge and understanding that science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management.	Developing knowledge and understanding that science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial

	selecting materials. Explains that scientific knowledge changes as new evidence becomes available, and some scientific discoveries have significantly changed people's understanding of the world.	management. Understands that scientific knowledge changes as new evidence becomes available.			resource management.
Science Inquiry Skills ACSIS054 ACSIS055 ACSIS053 ACSIS057 ACSIS064 ACSIS065 ACSIS066 ACSIS068 ACSIS216	Comprehensive knowledge and understanding of procedures such as identifying questions and problems that can be investigated scientifically and make predictions based on scientific knowledge. Collects data with accuracy appropriate to the task and summarise data using scientific language. Evaluating the quality of the data collected, and identify improvements to the method used to collect test. Comprehensively explains the	Thorough knowledge and understanding of procedures such as identifying questions and problems that can be investigated scientifically and make predictions based on scientific knowledge. Collects data with accuracy appropriate to the task and summarise data using their own words. Thoroughly explains the cause and effect of human impact on natural resources.	Satisfactory knowledge and understanding of procedures such as identifying questions and problems that can be investigated scientifically and make predictions based on scientific knowledge. Collects data with accuracy appropriate to the task and summarise data using their own words. Adequately explains the cause and effect of human impact on natural resources.	Variable knowledge and understanding of procedures such as identifying questions and problems that can be investigated scientifically and make predictions based on background knowledge. Collects data with variable accuracy appropriate to the task and summarise data using their own words. Makes some suggestions to explain the cause and effect of human impact on natural resources.	*R*udimentary knowledge of understanding of how to identify questions and problems that can be investigated scientifically and make predictions based on background knowledge. Collects data with some accuracy appropriate to the task and attempts summarise data using their own words. Makes basic connections to explain the cause and effect of human impact

	cause and effect of human impact on natural resources.				on natural resources.
Geographic knowledge ACHGK021 ACHGK024	Comprehensive knowledge of the significance of vegetation in the production of goods for human use. Demonstrates comprehensive knowledge of the need for sustainable management of forests with regard to maintaining the environment.	Thorough knowledge of the significance of vegetation in the production of goods for human use. Demonstrates thorough knowledge of the need for sustainable management of forests with regard to maintaining the environment.	Satisfactory knowledge of the significance of vegetation in the production of goods for human use. Demonstrates satisfactory knowledge of the need for sustainable management of forests with regard to maintaining the environment.	Variable knowledge of the significance of vegetation in the production of goods for human use. Demonstrates variable knowledge of the need for sustainable management of forests with regard to maintaining the environment.	Developing knowledge of the significance of vegetation in the production of goods for human use. Demonstrates rudimentary knowledge of the need for sustainable management of forests with regard to maintaining the environment.
Design and Technologies Knowledge and Understanding ACTDEK012 ACTDEK013	Makes practical suggestions using applied knowledge for conducting experiments and tests to understand the properties of materials including wood and suggests uses (with explanations) for wood products.	Makes practical suggestions, using prior knowledge for conducting experiments and tests to understand the properties of materials including wood and suggests uses for wood products.	Makes sensible suggestions for conducting experiments and tests to understand the properties of materials including wood. Makes some suggestion for uses of wood.	Makes some sensible suggestions for conducting experiments and tests to understand the properties of materials including wood.	Makes suggestions demonstrating a developing understanding for conducting experiments and tests to understand the properties of materials including wood.
Visual Art ACAVAM110 ACAVAM111 ACAVAM112	Comprehensively conveys ideas and messages through visual	Thoroughly conveys ideas and messages clearly, through	Satisfactorily conveys ideas and messages through visual medium.	Conveys some ideas and messages	Attempts to convey some ideas and messages

	medium, demonstrating a high level of artistic skills. Accurately explains how artwork related to the overall theme of wood as a sustainable and renewable resource. Chooses colour and images to represent the contrasting theme. Sources a comprehensive range of images of artwork using wood from other cultures and explains their significance.	visual medium. Thoroughly explains how artwork related to the overall theme of wood as a sustainable and renewable resource. Chooses colour and images to represent the contrasting theme. Sources a thorough range of images of artwork using wood from other cultures.	Satisfactorily explains how artwork related to the overall theme of wood as a sustainable and renewable resource. Chooses colour and images to represent the contrasting theme. Sources a satisfactory range of images of artwork using wood from other cultures.	through visual medium. Offers some explanation of how artwork related to the overall theme of wood as a sustainable and renewable resource. Chooses colour and images relate to the contrasting theme. Sources some images of artwork using wood from other cultures.	through visual medium. Offers a developing explanation of how artwork related to the overall theme of wood as a sustainable and renewable resource. Chooses colour and images that somewhat relate to the contrasting theme. Sources limited images of artwork using wood from other cultures.