



ACTIVITY: Recycled Paper

ACTIVITY OVERVIEW

The activity progresses to the process of recycling paper, which is the 'Produce' part of the design process, using selected materials to produce students' own recycled paper.

Introducing this topic, the focus is on the need to produce designed solutions, with emphasis on the 'Investigate' part of the design process. Why do we need to recycle paper? We have developed a lifestyle that includes a lot of paper use - from our schools, to our bathrooms - all using energy, water and trees for production.

SYNOPSIS

Trees provide habitats for animals, keep soil together, create beautiful spaces and produce oxygen for us to breathe. From toilet paper to notebooks, we use trees to make many paper products that make our lives easier.

Introducing this topic, the focus is on the need to produce designed solutions, with emphasis on the 'Investigate' part of the design process. Why do we need to recycle paper?

We have developed a lifestyle that includes a lot of paper use - from our schools, to our bathrooms - all using energy, water and trees for production.

To live more sustainably on planet Earth, we need to reduce our waste, energy, water, and resource use. Sustainability is about being able to meet the needs of people today, without impacting on the needs of people in the future.

We want kids in the future to be able to swim and play safely and have access to all the resources that we do now.

Recycling paper, rather than making it from trees, is one way that we can move towards more sustainable living.

The activity progresses to the process of recycling paper, which is the 'Produce' part of the design process, using selected materials to produce students' own recycled paper.

Foundation – Year 2

- Explore needs or opportunities for designing, and the technologies needed to realise designed solutions (VCDSCD018)
- Use materials, components, tools, equipment and techniques to produce designed solutions safely (VCDSCD020)
- Earth's resources are used in a variety of ways (VCSSU047)

Year 3 – 4

- Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to create designed solutions (VCDSCD028)
- Select and use materials, components, tools and equipment using safe work practices to produce designed solutions (VCDSCD030)
- Natural and processed materials have a range of physical properties; these properties can influence their use (VCSSU060)

Year 5 – 6

- Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions (VCDSCD038)
- Apply safe procedures when using a variety of materials, components, tools, equipment and techniques to produce designed solutions (VCDSCD040)

ACTIVITY, MATERIALS AND INSTRUCTIONS

Activity

We can do a better job of looking after our planet by recycling paper. In this activity, students make their own recycled paper bookmark or card, using everyday household and classroom equipment. Paper-making is best conducted outside, however inside is fine, if you have a vacuum cleaner to tidy up paper scraps.

Note – this activity will benefit from leaving paper soaking in water overnight.

Materials for 30 students

Working in five groups, each group needs:

- 2 litre milk bottle (washed and empty)
- Plastic tub (at least 10 litres)
- Sieve (approx. 20cm diameter)
- A few sheets of newspaper (easiest to pulp), used worksheets (easiest to find in a classroom) or gift wrap (most colourful)
- Drying towel (one per child) (e.g. microfibre cloth, tea towel)
- Access to water (warm water works better, but cold is ok)
- Plastic pocket (A4 sheet protector) – to dry paper on (or one sheet of paper towel per child)
- Marker to write names

Instructions

1. Tear newspaper into small pieces and stuff into the milk bottle.
2. Add approx. 1.5 litres of water to milk bottle (if possible, warm).
3. Shake well, with each group member having a turn.
4. Time permitting, leave bottles of paper to soak overnight.
5. Pour bottle of water into plastic tub. Add one more bottle full of water.

6. Use sieve to stir around paper, then take one scoop. Drain over tub.
7. Turn sieve upside down and plop paper bits onto towel.
8. Fold over drying cloth and pat down, to remove as much water as possible.
9. Flip the cloth and plop the paper shape onto a plastic pocket. Label plastic pocket with your name (or place on your desk).
10. Leave paper to dry.
11. Once dry, paper can be turned into a bookmark creature or card, depending on size.

HOW TO USE THIS ACTIVITY WITH YOUR STUDENTS

Foundation – Year 2

Recycled paper making combines Design & Technology with Science and Art for Foundation to Year two students. Introduce this activity by discussing paper use with your students.

Investigate

How do we use paper in our daily lives? Students may suggest books, worksheets, tissues, toilet paper, paper towel, newspapers, gift-wrapping, magazines, envelopes, cardboard boxes, board games, origami and art.

What happens to paper when we've finished using it? Your school probably has paper recycling bins and students should be able to locate these. Talk to students about what happens in the paper recycling factory.

You could use one of the Visy resources or act out recycling, using paper and students.

For example, allocate different machine jobs to groups of children to mime, until you have a whole paper recycling factory in your classroom! Include tasks like sorting, shredding, cleaning, de-inking with bubbles, squirting, pressing, drying, cutting.

Produce

Now it's our turn! Explain the recycling activity, demonstrating the process for students before they begin. It is helpful to do this activity earlier in the week and have a dried piece of recycled paper to show them. (Just in case they expect paper to look nice and white like their notebooks or worksheets!).

Add Maths to this activity, by using scissors to cut paper shapes out of the recycled paper blobs. Students could cut a circle, triangle, square, kite or rectangle, using words like corners and edges to describe their cutting.

Years 3/4

This activity combines Design & Technology, Science and Art for Year three and four students.

Investigate

What do we use paper for? Students may suggest books, worksheets, tissues, toilet paper, paper towel, newspapers, gift-wrapping, magazines, envelopes, cardboard boxes, board games, origami and art. As well as being such a useful and versatile product, paper can be recycled, so that we can use it all over again!

What other materials can we recycle? Discuss with students any recycling bins that are present at school. Find information from your local council about recycling in your school neighbourhood. Students at this age are likely to have some knowledge of the household recycling, but it's a good idea to confirm your local council recycling rules, as these vary across local government areas. Why do we use particular materials for different purposes? Consider some items used in your classroom made from different materials, for example, glass windows, plastic furniture, or metal

table legs. Students should think about the different properties that these materials have, and how those properties make them suitable for these different items.

What happens in a paper recycling factory? You could use one of the Visy resources or act out the recycling process using your students. For example, allocate different machine jobs to groups of children to mime, until you have a whole paper recycling factory in your classroom! Include tasks like sorting, shredding, cleaning, de-inking with bubbles, squirting, pressing, drying, cutting.

Produce

Now it's our turn! Our class will be a paper recycling factory, producing our own recycled paper products. It is helpful to do this activity earlier in the week (teacher only) and have a dried piece of recycled paper prepared to show students. (Just in case they expect paper to look nice and white like their notebooks or worksheets!).

Add to this activity by sprinkling a few seeds into your recycled paper before it dries. The dried seeded paper shapes can be cut into fun shapes and planted at home later. Tip – try to choose native plants, as this will be beneficial for the local animals too.

Years 5/6

Introduce this Design & Technology, Science and Art topic to your students by discussing the need for recycling.

Investigate

What materials can we recycle? Discuss with students any recycling bins that are present at school. Find information from your local council about

recycling in your school neighbourhood. Students at this age are likely to have some knowledge of the household recycling, but it's a good idea to confirm your local council recycling rules, as these vary across local government areas. Is there a good knowledge of recycling at your school? If not, students could think of some ways to improve recycling knowledge. (See Rubbish Audit activity in Maths topics.)

Why do we need to recycle? Sustainability means that we can meet the needs of the present, without impacting on people in the future being able to meet their needs. Sustainable practices include looking after the environment and improving the way we use resources. Students could research different resource use, either in Australia or in their school. How much paper, water, electricity does your school use? Are you good at recycling? Could you reduce the amount of your resource use?

Produce

Materials for recycling are taken to a factory, where they are separated and made into new products. Our classroom is now a recycling factory, where we make our own recycled paper. Show students paper recycling method.

Then, students at this level can be challenged to design their own recycled paper. What materials will they use? Students may choose to recycle worksheets, notices, gift wrap, paper towels, newspaper, magazines. Other aspects of the paper making that could be altered include the temperature of the water, amount of soaking time and size of torn paper pieces. These students may like to make larger pieces of recycled paper, to produce greeting cards.

To make larger pieces, students will need to tear up more paper at the start and join a few scoops from the sieve before the paper dries.

DISCUSSION SECTION AND KEY THEMES

KEY THEMES

Paper making process

How to make paper:

1. Wood is harvested and taken to the paper mill as logs.
2. Timber is sawn into shorter logs.
3. Bark is removed.
4. Timber cut into small chips.
5. Thermo-mechanical pulping (chips are ground between rotating discs and heated in water).
6. Cleaning (pulp is washed, screened, and bleached).
7. Paper machine – pulp is squirted from jets onto the wire, dried by suction, pressing and heat, as paper moves along the machine.
8. Paper is wound onto big rolls.
9. Paper is transported to other factories, to be made into products.

Diagram of paper making process:

https://holmen.imagevault.media/publishedmedia/rlq53hhi2a9e14h0bxuq/Infographics_Paper_Making_Process_2020_1920x1080.jpg

Every tonne of paper produced takes 24 trees plus 90,000 litres of water. That is a lot of resources needed!

Typical ingredients used to make white copy paper (e.g. Reflex Ultra White paper):

- 72% bleached pulp
- 23% calcium carbonate (ground limestone)
- 4.5% moisture
- 3.5% starch

Recycled paper making process

Visy is a major recycler in Australia. They have teacher resources available through their website, including worksheets and video clips. The recycled paper making process includes some of the same steps as paper making, above.

1. Used paper items are collected.
2. Used items are sorted, both manually and through machines.
3. Paper is separated into different categories (copy paper, newspaper, cardboard, contaminated).
4. Usable paper is shredded, then broken down further into its fibres.
5. Paper fibres are cleaned.
6. Paper fibres are put through a screen, to remove paper clips and staples.
7. Paper is de-inked (air bubbled through, ink attaches to bubbles, floats to top as scum and is removed).
8. Paper is bleached.
9. Pulp is squirted onto the paper machine and process proceeds as above.

The main product made from recycled paper in Australia is cardboard for packaging. Other recycled paper products include newspaper, copy paper, egg cartons, fruit trays and kitty litter.

Australia used to send recyclable materials overseas, particularly to China, however this changed in 2020 when exporting unprocessed waste materials was banned. We now only send processed recycled materials.

Recycled paper is not only saving trees - it also has other environmental benefits compared to virgin paper, by saving on energy use, water use, oil, minimising landfill stress and pollutants.

Paper use in Australia

Australians use a lot of paper. In 2018-19 Australia used 3,479,000 tonnes of fibre to make paper and paperboard, with around 45% of this from recycled materials.

This includes all types of paper use – from the office (e.g. copy paper, sticky notes) to the toilet (e.g. toilet paper, paper towels).

History of paper

Paper is a very useful item. Before paper, people recorded information on clay tablets, parchment (animal skin), vellum (calf skin), papyrus (the inside part of a plant was peeled, pressed together and dried), bamboo or silk.

Paper has been used for over 2000 years, first invented by the Chinese. They mixed mulberry bark, hemp and shredded cloth with water, mashed it all up into pulp, then pressed and dried the sheets of paper.

A process that hasn't changed a lot to today!

Paper was first used by the Chinese for padding, wrapping, toilet paper, tea bags, paper money, newspaper, and books – all well over 1000 years ago. From China, papermaking spread to Korea, Japan, Tibet, and India.

Countries who knew how to make paper tried to keep it a secret from others, but eventually papermaking knowledge spread through the Arab countries, then on to Europe around 1000 years ago.

Once printing presses were invented, books and newspapers allowed knowledge to be spread all over the world.

QUESTIONS AND ANSWERS

What is recycled toilet paper made from?

Recycled toilet paper is made from office paper, textbooks and newspaper. Sustainability Victoria tells us that: “if you are using regular toilet paper, you are literally flushing trees down the toilet”. Producing toilet paper by recycling used paper uses 50% less energy and 90% less water than making paper from raw materials.

What are some interesting items made from recycled paper?

Recycled paper has been used to make some great items, including furniture, drink bottles, clothes, bags, tables, tiles, sculptures, lamp shades and coffins. You can see some of these amazing designs here:

<https://greendiary.com/10-stunningly-green-products-recycled-paper.html>

<https://ecofriend.com/stunning-products-recycled-paper.html>

Do you think people will eventually stop using paper and use electronic devices instead?

We are already seeing less paper used in offices now, compared to in the past. With emails and online collaborating, there is less need to print documents.

School items that used to be printed out for parents are now being sent online including newsletters, permission forms, notices, and student reports. However, students still use a lot of paper in Australian primary school classrooms. It is likely that a lot of uses for paper will be replaced by digital technology, however there are some things that cannot be replaced. There will always be a place for toilet paper!

What are other commonly recycled materials?

Other commonly recycled materials in Australia are glass, metal, and plastic. Local council recycling (in cities) is expanding to include more items including light bulbs, batteries, paint, mobile phones, and electrical waste. There are also companies (such as Terracycle) that help facilitate recycling of more difficult materials, such as toothbrushes and contact lenses.

What are all those recycling symbols on products?

There are quite a few different symbols on our products that relate to recycling. You are probably familiar with the ‘three arrows’ recycling symbol. Some newer symbols include ones that show you what to do with separate parts of the packaging (e.g. box, wrap, lid), home compostable, industrial compostable and the tidyman (character putting something in a bin), to remind us to dispose of our rubbish correctly. You can read a bit more about recycling symbols here <https://www.sustainability.vic.gov.au/recycling-and-reducing-waste/at-home/recycling-at-home/packaging-symbols>.

Do they recycle election ballot papers after they’ve been counted?

Ballot papers are made from recycled paper, which is a good start. After counting has finished, House of Representatives ballot papers (the green ones) are kept for six to twelve months, while Senate ballot papers (the huge white ones) must be kept for seven years, in warehouse storage. This is just in case someone disputes one of the election results. After the

required storage period is over, all ballot papers are recycled. Also, the cardboard signs and booths are all recycled after the election (or re-used by the school venue). <https://www.abc.net.au/news/2019-05-21/where-your-ballot-papers-go-after-the-federal-election/11129160>

When did recycling start in Australia?

Recycling is old. Single-use and disposable is new! In the past, people reused and recycled many items at home and work. Organised paper recycling began in Australia in the 1920s, with wastepaper and cardboard from houses and factories collected and recycled into packaging.

The kerbside recycling collections, managed by local councils, began in the 1980s. Paper products, including milk cartons, cereal boxes, newspapers, magazines, pizza boxes and toilet rolls are collected. According to the Australian Bureau of Statistics, Australian households produced 2.2 million tonnes of paper and cardboard waste in 2018-19. At present, only 60% of waste in Australia is recycled, with all levels of government and industry working to increase this amount.

How do they get the ink off paper when they recycle it?

The recycled paper pulp (paper and water) has air blown into it, the ink then attaches on to the bubbles, and rises to the top in a dirty foam. The foam is skimmed off the top, leaving ink-free pulp.

Can I put staples and sticky tape in the paper recycling bin?

Yes, little contaminants like this will easily be removed in the pulping process. No worries! It's also ok to put in envelopes with little windows. Planet Ark's website (<https://recyclingnearyou.com.au/>) and your local council are the best resources for finding out recycling information in Australia.

How many times can you recycle paper?

Office paper can be recycled up to about seven times into more paper. Paper is made of fibres (threads) and each time you recycle it the fibres shorten. Once they get below a certain length, they cannot be remade into copier paper, but can still be recycled into lower quality products, including egg cartons or newspaper. Of course, once you make it into toilet paper, that cannot be recycled again! Glass and metal are the best items to recycle, as they can do it infinitely. Plastic is the worst for recycling, which is why it is such a big problem now.

OUTSIDE OR SUPPLEMENTARY READING

Recycling education resources – Visy

<https://www.coolaustralia.org/cool-project-explorer/visy-education-resources/>

<https://www.visy.com.au/recycling/about>

How many times recycled?

<https://earth911.com/business-policy/how-many-times-recycled/>

The history of paper

<https://interestingengineering.com/the-long-and-complex-history-of-paper>

TOPIC WORDS

- Process
- Factory
- Sustainability
- Resources
- Paper
- Recycling
- Materials



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