Caritas AUSTRALIA

Realising African Visions: strong people, powerful communities

Design and Technologies Education Resources

Upper Primary (Y5-6)

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Last updated April 2015

A NOTE TO TEACHERS

Caritas AUSTRALIA

Curriculum

These resources have been written using the Australian Curriculum- Design and Technologies. If your school is not using the Australian Curriculum for Design and Technologies then please make the relevant links to your school/State curriculum. Suggested links to other curriculum areas for an integrated learning experience are also provided.

About AACES

The Australia Africa Community Engagement Scheme (AACES) is a partnership between Caritas Australia, our partner in Malawi, CADECOM, and the Australian Government (DFAT). AACES is a five-year program that is working to increase food security and improve access to clean water and hygiene facilities in Tanzania and Malawi.

As part of the AACES community education program, communities in Malawi made 'How to build' videos for four of the community's activities: energy-saving stoves, dish-drying racks, tippy taps and vertical gardens. It is these four 'How to build' videos that form the basis of this learning experience.

Caritas Australia's approach to community development

It is important for teachers to understand Caritas Australia's approach to community development. We use a strength-based community development approach which recognises the strengths within and among communities and then builds on these strengths. You can use the PowerPoint included in this zip file to learn more about Caritas Australia's Strength Based Approach (SBA) or visit the Strength Based Approach page of our website.

Caritas Australia is also guided by the principles of Catholic Social Teaching (CST). These four 'How to build' videos and the community development activities they highlight demonstrate the principles of CST in action. These principles include: dignity of the human person; preferential option for the poor; stewardship of the environment; subsidiarity and participation; the common good; and solidarity. To learn more about the principles of Catholic Social Teaching, please use our interactive online toolkit which has education resources for F -12.

How to use this resource

We have aimed to create a flexible learning experience that can easily be adapted to suit each teacher and their students. Each of the four learning experiences follow the same process, so it is possible to break your class into four groups, with each group assigned a different build project, and have them work simultaneously. Or, you might choose to focus on one as a class. This would be a great opportunity to involve parents to assist in the classroom, particularly any parents with skills in these areas. We would appreciate your feedback and any examples of students' work you would like to share. You can contact us at education@caritas.org.au

AUSTRALIAN CURRICULUM

DESIGN AND TECHNOLOGIES

Years 5 and 6 Band Description

By the end of Year 6 students will have had the **opportunity to create designed solutions** at least once in four technologies contexts: Engineering principles and systems, Food and fibre production, Food specialisations and Materials and technologies specialisations. Students should have opportunities to experience designing and producing products, services and environments.
In Year 5 and 6 students **critically examine technologies** – materials, systems, components, tools and equipment – that are used regularly in the home and in local, national, regional or **global communities, with consideration of society, ethics and social and environmental sustainability factors.** Students consider **why and for whom** technologies were developed.
Students engage with ideas beyond the familiar, exploring how design and technologies and the people working in a range of technologies contexts contribute to society. They seek to explore innovation and establish their own design capabilities. Students are given new opportunities for clarifying their thinking, creativity, analysis, problem -solving and decision-making. They explore trends and data to imagine what the future will be like and suggest design decisions that contribute positively to preferred futures.
Using a range of technologies including **a variety of graphical representation techniques** to communicate, students represent objects and ideas in a variety of forms such as **thumbnail sketches, models, drawings, diagrams and storyboards to illustrate the development of designed solutions**. They use a range of techniques such as **labelling and annotating sequenced sketches and diagrams** to illustrate how products function; and recognise and use a range of drawing symbols in context to give meaning and direction.
Students **work individually and collaboratively** to identify and sequence steps needed for a design task. They negotiate and develop plans to complete design tasks, and follow plans to complete design tasks safely, making **adjustments to plans** when necessary. Students identify, plan and maintain safety standards and practices when making designed solutions.

Design and Technologies Knowledge and Understanding

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)
Investigate how and why food and fibre are produced in managed environments (ACTDEK021)
Investigate the role of food preparation in maintaining goodhealth and the importance of food safety and hygiene (ACTDEK022)
Investigate characteristics and properties of a range of materials, systems, components, tools and equipment and evaluate the impact of their use (ACTDEK023)

Design and Technologies Processes and Production Skills

Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions (ACTDEP024)
Generate, develop, communicate and document design ideas and processes for audiences using appropriate technical terms and graphical representation techniques (ACTDEP025)
Apply safe procedures when using a variety of materials, components, tools, equipment and techniques to make designed solutions (ACTDEP026)
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)

AUSTRALIAN CURRICULUM

GENERAL CAPABILITIES (Y5-6)

ICT

Generate ideas, plans and processes: use ICT effectively to record ideas, represent thinking and plan solutions

Generate solutions to challenges and learning area tasks: independently or collaboratively create and modify digital solutions, creative outputs or data representation/transformation for particular audiences and purposes

CRITICAL AND CREATIVE THINKING

Imagine possibilities and connect ideas: combine ideas in a variety of ways and from a range of sources to create new possibilities

Consider alternatives: identify situations where current approaches do not work, challenge existing ideas and generate alternative solutions

Seek solutions and put ideas into action: assess and test options to identify the most effective solution and to put ideas into action

INTERCULTURAL UNDERSTANDING

Explore and compare cultural knowledge, beliefs and practices: describe and compare the knowledge, beliefs and practices of various cultural groups in relation to a specific time, event or custom

CROSS-CURRICULUM PRIORITY (Y5-6)

SUSTAINABILITY

OI.2 All life forms, including human life, are connected through ecosystems on which they depend for their wellbeing and survival.
OI.3 Sustainable patterns of living rely on the interdependence of healthy social, economic and ecological systems.

OI.4 World views that recognise the dependence of living things on healthy ecosystems, and value diversity and social justice are essential for achieving sustainability.

OI.5 World views are formed by experiences at personal, local, national and global levels, and are linked to individual and community actions for sustainability.

OI.6 The sustainability of ecological, social and economic systems is achieved through informed individual and community action that values local and global equity and fairness across generations into the future.

OI.7 Actions for a more sustainable future reflect values of care, respect and responsibility, and require us to explore and understand environments.

OI.8 Designing action for sustainability requires an evaluation of past practices, the assessment of scientific and technological developments, and balanced judgments based on projected future economic, social and environmental impacts.

OI.9 Sustainable futures result from actions designed to preserve and/or restore the quality and uniqueness

Learning Sequence– Tippy tap

Big Idea: How can I wash my hands if there is no running water and taps available?

INVESTIGATE

Introduction: Explain that many people in our world live where there are no taps or water pipes at their house or school. Ask students to reflect on what impact this would have on their life.

Think, pair, share: **Why is hand washing important? When do I wash my hands? Where does water come from if there are no taps (pump, rainwater tank, river)?**

Explain to the students they are about to watch a two minute video about how a rural village in Malawi used locally available materials to build their own special tap, called a tippy tap. Use a world map to show where Malawi is. You could use the case study of Bule to introduce how some families live in Malawi and how Caritas Australia is working with these communities.

Watch the two minute video on 'How to build a tippy tap' .

Teacher information: The stand with a plate on top contains hand washing soap. For households that can afford to buy soap, they use the chemically manufactured soap, but those who cannot afford it use ashes instead. The plastic containers and the cup can be purchased from local markets. Sometimes the household will recycle an old container which was used for cooking oil and tailor make it to serve the purpose of a hand washing facility. They dig a hole underneath the tippy tap and cover with rocks to catch the water. This prevents pools of water under the tippy tap. It is important to avoid stagnant pools of water that could turn into a breeding environment for mosquitos and increase the risk of malaria.

- **Another example and instructions on building a different type of tippy tap can be downloaded here.**

TASK: Video response—Connect, Extend, Challenge and/or Tippy tap question sheet. (Worksheets provided)

GENERATE

As a class, brainstorm the strengths of the tippy tap. Use this to create a design checklist (criteria for success) for students to use when designing their own tippy tap.

TASK: Student plan to build a tippy tap

Using the video as a guide, in groups students plan to build their own tippy tap. Students record the following in their workbook or design folio:

- Materials needed – list or draw and label. Materials will differ to the video slightly to what students have available. Can students think of appropriate alternatives?
- Where will they build their tippy tap?
- Draw a diagram of their tippy tap design.
- Label the drawing and provide dimensions. How high will the cross bar need to be? Why? How much water will be in the bucket? How many holes will you need in your cup?
- Create a storyboard to illustrate the development of their designed solutions (or use the sequencing activity worksheet) .
- Review the group design plan against the design checklist to ensure it meets all the criteria.

PRODUCE

TASK: Build and review the tippy tap
(Students could take photos or video of the build process and use their own photos for a sequencing activity.)

Students review their finished product against their plan:

- Did they have everything they needed to build the tippy tap?
- What was the hardest part to build?
- How can you improve the tippy tap? (This could be a verbal activity.)
- Make modifications and test again.
- Did your improvement work?

TASK: Complete a drawing of the final product
(Two-dimensional drawing: front, top and side view—worksheet provided)

EVALUATE

Students view and use the other groups' tippy taps.
Students assess against the class design checklist developed earlier.
Students vote for the best design and provide a reason why they made their decision.

Reflection – Watch the video again.

Use the Catholic Social Teaching worksheet to see if students can identify the principles of Catholic Social Teaching.

Note: To learn more about Catholic Social Teaching please use our Upper Primary Catholic Social Teaching interactive online tool.

Extension Activity

Design a set of posters to highlight the importance of washing your hands and how to use the tippy tap. Students could use an online tool such as www.glogster.com to create a digital poster.

Students brainstorm what elements are necessary for a good hand washing poster. This becomes the criteria for evaluation. Suitable for desired audience, visually appealing, clear explanations, motivating etc.

Students present/display their posters to the class.

Learning sequence—Dish-drying rack

Big Idea: Without a kitchen (and running water), how can we wash and dry the dishes?

INVESTIGATE

Introduction: Explain that many people in our world don't have kitchens in their homes or pipes and taps for running water. Ask students to reflect on what impact this would have on their life.

Think, pair, share: Where would I get water to clean my dishes? How would I clean and dry my dishes?

Explain to the students they are about to watch a short video about how a rural village in Malawi used locally available materials to build their own dish-drying rack. Use a world map to show where Malawi is. You could use the case study of Bule to introduce how some families live in Malawi and how Caritas Australia is working with these communities.

Watch the two minute video on 'How to build a dish drying rack'.

Teacher notes: A large shallow hole is dug under the dish-drying rack and is filled with stones to prevent pooling of water. Stagnant pools of water could become breeding places for mosquitoes and therefore increase the risk of malaria so it is really important to avoid this.

TASK: Video responses—Connect, Extend, Challenge and/or Dish-drying rack question sheet. (Worksheets provided)

GENERATE

As a class, brainstorm the strengths of the dish-drying rack and use this to create a design checklist to use when designing their own dish-drying rack.

TASK: Students plan to build a dish-drying rack.

Using the video as a guide, in groups students plan to build their dish-drying rack. Students record the following in their workbook or design folio:

- Materials needed – list or draw and label. Materials will differ to the video slightly to what students have available. Can students think of appropriate alternatives?
- Where will they build their dish-drying rack?
- Draw a diagram of their dish-drying rack design.
- Label the drawing and provide dimensions. How high and wide will it be?
- How will they stop it from falling down?
- Create a storyboard to illustrate the development of their designed solutions (or use the sequencing activity worksheet) .
- Review the group design plan against the design checklist to ensure it meets all the criteria.

PRODUCE

TASK: Build and review the dish-drying rack.
Students could take photos or video of the build process and use their own photos for a sequencing activity. If you don't have the resources to build a real dish-drying rack, students could build a model rack using materials found around the classroom.

Students review their finished product against their plan:

- Did they have everything they needed to build the dish-drying rack?
- What was the hardest part to build?
- How can you improve the dish-drying rack? (This could be a verbal activity.)
- Make modifications and test again.
- Did your improvement work?

TASK: Complete a drawing of the final product
(Two-dimensional drawing: front, top and side view—worksheet provided)

EVALUATE

Students view and use the other groups' dish-drying racks. (The students could wash up their lunchboxes after lunch.)
Students assess against the class design checklist developed earlier to evaluate each design.
Students vote for the best design and provide a reason for their decision.

Reflection – Watch the video again.

Think, pair share: Students compare their own experience of building a dish-drying rack with that demonstrated in the video. Was it easy to work together? Did everyone have a chance to participate? How did your group make the decisions?

TASK: Catholic Social Teaching
Use the Catholic Social Teaching worksheet to see if students can see the principles in action throughout the video.

Note: To learn more about Catholic Social Teaching please use our Upper Primary Catholic Social Teaching interactive online tool.

Extension Activity

Design a set of posters to teach others how to build a dish-drying rack. Students could use an online tool such as www.glogster.com to create a digital poster.

Students brainstorm what elements are necessary for a good poster. This becomes the criteria for evaluation. Suitable for desired audience, visually appealing, clear explanations, motivating etc.

Students present/display their posters to the class.

Learning sequence— Vertical garden

Big Idea: If we don't have enough money to buy food, how can we grow our own food close to our home?

INVESTIGATE

Introduction: Explain that many people in our world don't have enough food to eat. Ask students to reflect on what impact this would have on their life. NB. If you want to incorporate this into a broader inquiry unit on food, see our Food for All resource.

Think, pair, share: Where does my food come from? Is it bought or grown? How can people who don't have very much money have enough food to eat?

Explain to the students they are about to watch a short video about how a rural village in Malawi used locally available materials to build their own vertical garden. Use a world map to show where Malawi is. You could use the case study of Bule to introduce how some families live in Malawi and how Caritas Australia is working with these communities.

Watch the two-minute video on 'How to build a vertical garden'.

Teacher information: The fence around the garden is to protect the plants from animals. Families use old maize or fertilizer bags. The column of stones is where the water is poured and filters the water to the soil where the vegetable grow. The vertical gardens are primarily used for vegetables such as lettuce, mustard seed, Chinese cabbage, rapeseed, and tomatoes. It is a way of bringing vegetables closer to the household. In the context of dry areas these gardens are easily managed; they require less water, thus with little water a household grows a vegetable garden- enough to feed the family, and to potentially sell the surplus.

TASK: Video responses—Connect, Extend, Challenge and/or Vertical Garden question sheet. (Worksheets provided)

GENERATE

As a class, brainstorm the strengths of the vertical garden and use this to create a design checklist (criteria for success) for students to use when designing their own vertical garden.

TASK: Students plan to build a vertical garden

Using the video as a guide, in groups students plan to build their vertical garden. Students record the following in their workbook or design folio:

- Materials needed – list or draw and label. Materials will differ to the video slightly to what students have available. Can students think of appropriate alternatives?
- Where will they build their vertical garden?
- Draw a diagram of their vertical garden design.
- Label the drawing and provide dimensions. How high and wide will it be?
- Create a storyboard to illustrate the development of their designed solutions (or use the sequencing activity worksheet).
- Review the group design plan against the design checklist to ensure it meets all the criteria.

PRODUCE

TASK: Build and review the vertical garden
Students could take photos of the build process and use their own photos for a sequencing activity.

Students review their finished product against their plan.

- Did they have everything they needed to build the vertical garden?
- What was the hardest part to build?
- How can you improve the vertical garden? (This could be a verbal activity.)
- Make modifications and test again.
- Did your improvement work?

TASK: Complete a drawing of the final product
(Two-dimensional drawing: front, top and side view—worksheet provided)

EVALUATE

Students view the other groups' vertical garden.
Students assess against the class design checklist developed earlier to evaluate each design.
Students vote for the best design and provide a reason for their decision.

Reflection – Watch the video again.

Think, pair share: Students compare their own experience of building a vertical garden with that demonstrated in the video. Was it easy to work together? Did everyone have a chance to participate? How did your group make the decisions?

TASK: Catholic Social Teaching
Use the Catholic Social Teaching worksheet to see if students can see the principles in action throughout the video.

Note: To learn more about Catholic Social Teaching please use our Upper Primary Catholic Social Teaching interactive online tool.

Extension Activity

Design a set of posters to teach others how to build a vertical garden. Students could use an online tool such as www.glogster.com to create a digital poster.

Students brainstorm what elements are necessary for a poster. This becomes the criteria for evaluation. Suitable for desired audience, visually appealing, clear explanations, motivating etc.

Students present/display their posters to the class.

Learning sequence— Energy-saving stove

Caritas AUSTRALIA

Big Idea: Without electricity or gas, how do families in rural areas of Africa cook their food?

INVESTIGATE

Introduction: Explain that many people in our world don't have electricity or gas to cook food. Ask students to reflect on what impact this would have on their life.

Think, pair, share: How is my food cooked? If people cook using a fire, where would the wood come from? Would I like to have my food cooked on an open fire every day? Why or why not?

In rural communities of Malawi, families have traditionally used an open fire with three large rocks to cook. Unfortunately this requires a lot of wood, which is bad for the environment and creates a lot of smoke that is breathed in, which has a harmful effect on the health of families.

Explain to the students they are about to watch a short video about how a rural village in Malawi is using locally available materials to build their own energy saving stoves. Use a world map to show where Malawi is. You could use the case study of Bule to introduce how some families in Malawi live and how Caritas Australia is working with these communities.

Watch the two minute video on 'How to build and energy-saving stove'.

Teacher information: These energy-saving stoves use only one third of the wood compared to an open fire and are designed so the smoke is directed away from the person cooking. The cement is generally made from 80% soil, 10% clay and 10% sand but is adapted to what is available. Cow dung, if available, is used to cement the stove. With no cement mixers in the community, people step on the mixture to get a good bind. It takes two to three days at most to have it ready for use. It does not take long to dry, and the burning further hardens the stove.

TASK: Video responses—Connect, Extend, Challenge and/or the Energy-saving stove question sheet. (Worksheets provided)

GENERATE

Note: Before completing the planning and building of the stove, determine what resources and parent assistance you have. This is a great opportunity to involve parents, particularly those with skills in cement making and building. Alternatively, students could make a model stove using materials found around the classroom.

Safety First!

Australian Curriculum: Students identify, plan and maintain safety standards and practices when making designed solutions.

Before planning to build an energy-saving stove, please check with your local fire authorities if there could be a fire ban in place. Students should be aware of safety precautions needed when working with fire. Teachers will need to ensure there are appropriate safety measures in place such as having water or sand available to extinguish a fire quickly if it is posing a hazard.

Task: Design Checklist

As a class, brainstorm the strengths of the energy-saving stoves and use this to create a design checklist (criteria for success) for students to use when designing their own stove.

TASK: Students plan to build an energy-saving stove

Using the video as a guide, in groups students plan to build their energy-saving stove. Students record the following in their workbook or design folio:

- Materials needed – list or draw and label. Materials will differ to the video slightly to what students have available. Can students think of appropriate alternatives?
- Where will they build their energy-saving stove?
- Draw a diagram of their energy-saving stove design.
- Label the drawing and provide dimensions. How high and wide will it be?
- Create a storyboard to illustrate the development of their designed solutions (or use the sequencing activity worksheet) .
- Review the group design plan against the design checklist to ensure it meets all the criteria.

PRODUCE

TASK: Build and review the energy-saving stove
Students could take photos or video of the build process and use their own photos for a sequencing activity.

Students review their finished product against their plan.

- Did they have everything they needed to build the energy-saving stove?
- What was the hardest part to build?
- How can you improve the energy-saving stove? Could be a verbal activity.
- Make modifications and test again.
- Did your improvement work?

TASK: Complete a drawing of the final product
(Two-dimensional drawing: front, top and side view—worksheet provided)

EVALUATE

Students view the other groups' energy-saving stove.
Students assess against the class design checklist developed earlier to evaluate each design.
Students vote for the best design and provide a reason for their decision.

Reflection – Watch the video again.

Think, pair share: Students compare their own experience of building an energy-saving stove with that demonstrated in the video. Was it easy to work together? Did everyone have a chance to participate? How did your group make the decisions?

TASK: Catholic Social Teaching
Use the Catholic Social Teaching worksheet to see if students can see the principles in action throughout the video.

Note: To learn more about Catholic Social Teaching please use our Upper Primary Catholic Social Teaching interactive online tool.

Extension Activity

Design a set of posters to teach others how to build an energy-saving stove. Students could use an online tool such as www.glogster.com to create a digital poster.

Students brainstorm what elements are necessary for a good poster. This becomes the criteria for evaluation. Suitable for desired audience, visually appealing, clear explanations, motivating etc.

Students present/display their posters to the class.

For more information or resources, please visit our website:

www.caritas.org.au/schools

Contact us at

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Caritas AUSTRALIA

End poverty
Promote justice
Uphold dignity