

ACTIVITY TWO: WATER POWER!

During this **TECHNOLOGY** exercise, learners investigate, design, make and evaluate their own water or steam power designs.



Coal supplies most of South Africa's electrical energy. It is a finite, non-renewable resource. Burning coal to produce electricity causes serious environmental problems. Pollution from power stations contributes to global warming. In addition to the environmental challenges associated with energy supply, South Africa faces significant social challenges. Although we produce half of the electricity on the African continent, 40% of South Africans do not have access to electricity and rely instead on fuelwood and other inconvenient fuels such as coal, paraffin, gas, or candles. It is important that South Africa addresses both the environmental problems associated with energy supply, and the inequalities in access to adequate and affordable energy.

How can we provide adequate and affordable energy for all, while promoting environmental sustainability?

What the learners need to do:

1. Investigate whether water or steam can generate electricity

The investigation phase is the research phase. Learners need to understand and explain the energy problems that South Africans are facing today; they need to locate information on existing water or steam generators by looking at pictures of water wheels and steam engines and at books and any other material that they can find on water power. They can also discuss their ideas with friends, in small groups and with you, the teacher. Let the learners write a paragraph on their "research" which should include what sources of information they used, where they found these sources, what they found out, what they think they would like to design.

2. Design

- Each learner will need paper and pencils so that they are able to write and draw their design ideas. There needs to be a short, clear statement (or design brief) for their design. The design must be on paper and learners should make rough drawings first. When they are happy with their designs, they need to make a neat drawing with a heading and labels or a colour key. The dimensions of the design must be written down and the materials that will be used must be listed. Any constraints/restrictions that the learner can see/anticipate in the future must also be noted. In addition, the learner must work out the cost of the design, how safe it will be, what the product will do.
- It is very important that you, the teacher, guide the learners through this design phase. Some of the learners' designs may be wonderfully creative but very impractical, so you need to be on hand to make sure that their designs will work.

3. Make

- The learners need to gather together the materials they will need to construct their design. They will need to develop plans for their designs which include a resource list (the materials and tools needed and their costs; formal drawings showing dimensions or quantities (such as ‘exploded views [An exploded view is a representative picture or diagram that shows the components of an object slightly separated by distance, or suspended in surrounding space]; orthographic views [orthographic drawings are front, side, top, etc views of an object. An orthographic view is only one side. It takes several views to show the whole object], isometric views [a method of visually representing three-dimensional objects in two dimensions]; sequence drawings [a drawing of each stage of manufacture and includes brief notes or instructions. It normally follows a flowchart which simply lists each stage]; and the sequence (by way of a flow chart) of how the product will be built.
- Encourage the learners to use recycled objects if possible. When they have all they need, the designs need to be constructed. Remind them that they need to make sure they are precise and careful when making their design and they need to work safely with any tools they use.

4. Evaluate

- Test the designs!! Do they work, how well? After testing individual designs, learners can set up their designs at the front of the class and demonstrate them to everyone. Learners need to ask themselves if their designs could be improved on – how? There may even be some constructive comments from the rest of the class during the demonstrations.

Criteria to assess learners during this technology lesson

Criteria	Exceeded requirements of the Learning Outcome	Satisfied requirements of the Learning Outcome	Partially satisfied requirements of the Learning Outcome	Not satisfied requirements of the Learning Outcome
The learner was able to identify that energy generation is an environmental problem in South Africa (<i>teacher, the learners will have written a paragraph on this during the investigation phase</i>)				
The learner located and made use of a number of references (such as books, used the Internet, newspapers) during the investigation process				
The learner wrote a clear statement (design brief)				
The learner listed the products and design specifications				
The learner made a note of any constraints				
The learner drew formal drawings of the design				
The learner drew a flow chart of how the design would be built				
The learner worked carefully and safely				