

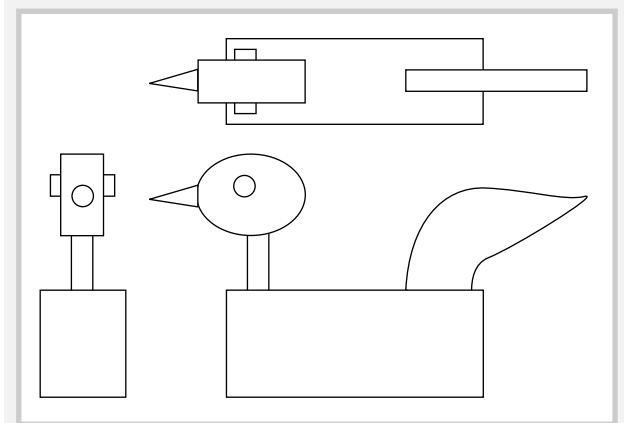
This doesn't mean that there shouldn't be any drawings made prior to building a model. Drawings can be produced to show intention and to record ideas. Drawings may be used to list components or help with devising a strategy for 'designing'.

A strategy is a 'plan of action', and it is fair to say that children should have a plan of action if they are to solve a problem. They need to identify targets and work out ways to reach them. They may have to develop an alternative plan in case the first plan doesn't produce satisfactory outcomes, they then will have two plans.

Confusion seems to emanate from this plural term, 'plans'. Yes, children should be encouraged to work from a plan, or even two, but this isn't necessarily the same as working from 'plans'. When we think of 'plans' we get an idea of 'drawings or 'blueprints', and this is perhaps why so many people seem to think that children should draw such plans.

It isn't wrong to make a drawing of what you think your model might look like, indeed, the exercise could help, but this isn't the same as producing drawings of what it will look like. Especially if these are 'rough' sketches that are then developed into 'detailed' working drawings.

The time for such drawings, if they are to be made at all, is AFTER the problems have been solved - after successful construction and testing, because then the drawings have a useful, recognisable purpose. They exist so that someone else can make another model, a copy of the prototype.



**ORTHOGRAPHIC PROJECTION**

Shown here is a small imaginary toy. There are three views: a top view, (or PLAN), a side view, (SIDE ELEVATION) and an end view, (END ELEVATION). They are arranged so that each view is beside its position on the side elevation. ie. the plan view is shown above the side view, and, in this case, the end view shows the front of the toy.

We have shown similar views of many of the projects in the manual. Note that some parts seem to change shape. The eye is a disc in the side view but a rectangle in the other two views. It is a cylinder. What shape is the neck?

**THE DESIGN PROCESS**

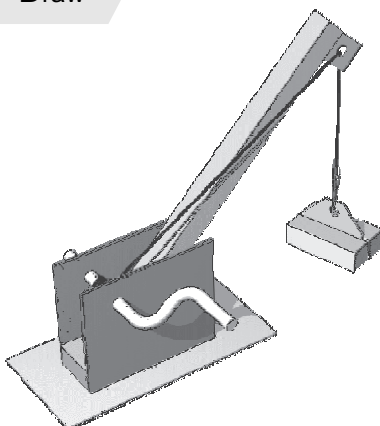
We've all heard a lot about the design process during the last few years. Its central position in the previous Technology Guidelines saw to that. Unfortunately the process that was outlined was best suited to an adult approach to designing. It presupposes a level of experience that primary children haven't had time to acquire. The result is that children are repeatedly faced with failure. Teachers have been encouraged to see designing as a pencil and paper exercise. As we have already pointed out on the previous page, children's drawing skills are unlikely to be able to cope with these demands. Designing needs to be a three-dimensional activity, the pencil and paper can be used to record results but they can't solve the problems. Children should be encouraged to model their ideas using three-dimensional materials. Card and wood is ideal, and so are the various construction kits that can be found in primary schools. It's far easier to build a Lego gearbox than it is to draw one.

We have been offered various acronyms to help us remember the steps that make up the design process. Here is our contribution, **INTREPID**. As the word suggests, it's a bolder approach!

- Identify
- Need
- Tactics
- Research
- Experiment
- Prototype
- Improve
- Draw

*'Design & Make' activity should be exciting and adventurous. Let's face it - it's "to boldly go where none have gone before". For each child, it's a voyage of discovery, and we shouldn't ask them to spend too much of the available time studying bus timetables! The 'clues' that point the way are to be found by becoming familiar with materials, tools and processes. We should encourage an intuitive approach, and not bury spontaneity beneath a mountain of paperwork. Let's favour INTREPID explorers over the market researchers.*

You may notice that 'Evaluation' doesn't appear in our list. This is not because we don't see a place for it, but rather because 'evaluation' should surely be a fundamental part of every stage of the design process.



The drawing on the right was produced by a Primary 3 pupil. We are displaying it here because it demonstrates the limitations of a young child's pictorial representation.

It is a drawing of the crane shown on the left, and it was made after the child had built a similar crane. You will notice that all the important components are represented in the correct relative positions. Armed only with this drawing, one would be able to identify the specific model, with little difficulty, from among a collection of other models. It does not, however, offer any suggestion of HOW it was made.

