



Dr. David Barlex expands on his article from the last issue exploring ways we can plan-in design decisions for pupils.

DESIGN DECISIONS – THE KEY TO SUCCESS IN DMA'S

Pupils make design decisions when they tackle designing and making assignments (DMAs). In these assignments pupils are expected to generate and develop design ideas and then make a prototype product based on those design ideas, which can be evaluated against the performance criteria the design was intended to meet.

In dealing with novice designers (your pupils) you can orchestrate the number and complexity of the design decisions that the pupils have to make in carrying out a design and make activity in order to ensure that the assignment is appropriately challenging without being daunting and requires pupils to use particular parts of the design & technology programme of study. So an important first step is to audit the range of design decisions that are likely to be made by pupils tackling the assignment.



This audit can be carried out using five key areas of design decision: conceptual (overall purpose of the design, the sort of product that it will be), technical (how the design will work), aesthetic (what the design will look like), constructional (how the design will be put together) and marketing (who the design is for, where it will be used, how it will be sold). This can be represented visually as shown in Figure 1 with each feature at a corner of pentagon and each area of design decision connected to each other area. This inter-connectedness is an important feature of design decisions. A change of decision within one area will affect some if not all of design decisions that are made within the others. For example if the way a design is to work is changed this will almost certainly affect what the design looks like and how it is constructed. It may also have far reaching effects in changing some of the purposes that the design can meet and who might be able to use it.

Usually you will identify the sort of product your pupils will be designing and making. This makes it very difficult for them to engage in conceptual design. But even if the type of product is identified for the pupils there are still many opportunities for making design decisions in the other areas.

Consider the designing and making of a puppet theatre and puppets. The pupils can make decisions about who will use the puppets and what for (marketing decisions), what sort of puppets would be appropriate, the sort of theatre such puppets would need, the nature of props and scenery plus any special effects that might accompany the performance. These decisions will encompass a host of technical, aesthetic and constructional design decisions.

Designing and making simple sensing devices is a standard activity at Key Stage 3 – almost the equivalent of the teapot stand of yore. What range of products would be obtained if pupils were empowered to make design decisions instead, as is often the case, produce the working circuit and place it in a case produced from a former provided by the teacher?

BASIC

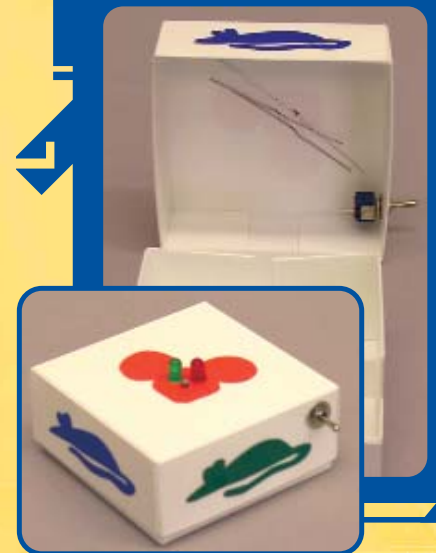
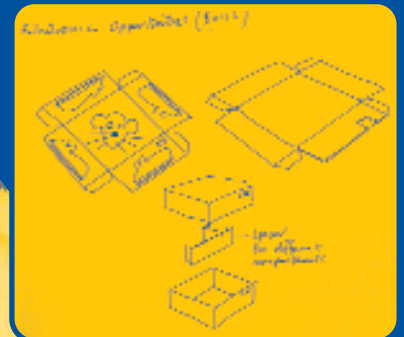
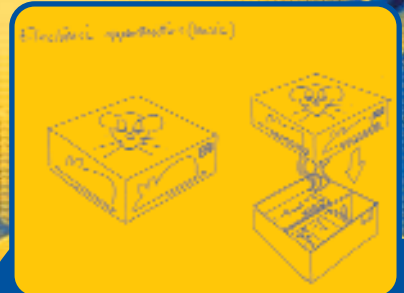


Figure 1. One way of representing the areas of design decision that pupils may need to make when tackling a DMA.

The examples shown in the panel show possible responses at basic, intermediate and advanced levels using construction techniques accessible to pupils at Key Stage 3 – attractive forms from nets (or surface developments as we used to call them). The brief for the DMA is to design a temperature sensing device that could be sold in a chain of shops that provided goods and materials for people who owned and cared for pets. The basic response is simple a two part divided box to hold the sensing circuit and battery decorated to show which pet it is to be used for. The intermediate response is a box to hold circuit and battery but shaped to resemble the pet it is intended for. The advanced response is a combination of five nets giving a complex 3D form representing the pet it is for. In these responses there was no conceptual or marketing design decisions but considerable aesthetic and constructional design decision making at different levels of sophistication.

As far as technical design decisions are concerned these can be made in differentiated ways as follows:

- ❖ The pupil assembles a given sensing circuit using given components and given printed circuit board – no technical design decisions
 - ❖ the pupil designs the printed circuit board layout which she uses with a given circuit and given components – basic technical design decisions
 - ❖ the pupil has some choice of components within a given circuit and produces the printed circuit board design – intermediate technical design decisions
- and finally
- ❖ the pupil designs the circuit including component values and designs a suitable printed circuit board layout – advanced technical design decisions.

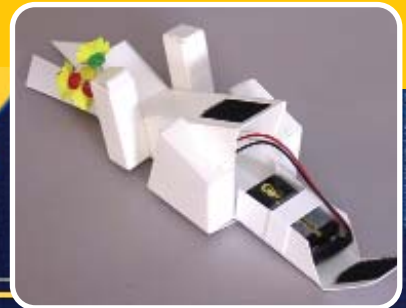
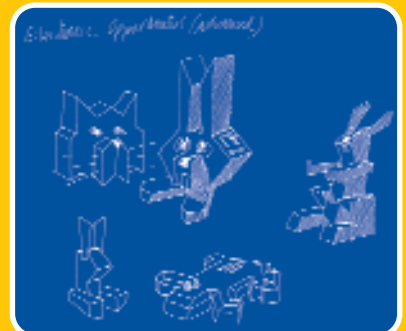
TEP has developed a range of resources that allow pupils to meet these different levels of technical design decision-making. Note it is possible for a pupil to produce a basic design with regard to the net, which encloses an advanced circuit and vice versa. It will be the guidance that you provide that will allow a pupil to maximise their design decision-making.

INTERMEDIATE

Electronic Appliances (Intermediate)



Electronic Appliances (Intermediate)



DESIGN