

Criteria for Success

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Rob Johnsey examines the close relationship between the design specification and evaluation of designed products at primary level

Evaluation is a skill which teachers would like to encourage in all areas of the curriculum but its special importance to design and technology was highlighted by making it the title of Attainment Target 4 in the current (1990) orders. During subsequent consultation documents the AT was relegated firstly to a strand (DFE, 1992) and finally a section heading in the current draft orders (SCAA, 1994). This, quite correctly, was in recognition that evaluation, while being a skill with its own unique attributes, is constantly carried out throughout the whole process of designing and making.

There is often much confusion over the word evaluation as used in the context of D&T. It frequently gets mixed up with concepts such as pupils' self-evaluation and teachers' assessment of children. In this article evaluation is taken to mean the judgements that pupils make about:

- *products* which have been designed and made and/or
- the *processes* which have been used in designing and making.

Baynes (1992) suggests that evaluation has two distinct branches: 'There is first the ability to appreciate, analyse and debate what others have done. . . The second is the ability to analyse, criticise and learn from the child's own activity'. In the second example there is a danger of confusing the evaluation of the learning process with the evaluation of the design process. It would be relatively easy to ask a pupil to make judgements about how something was designed and made but quite difficult for that pupil to evaluate how effective his or her own learning was. To clarify the picture, we can think of pupils making evaluations of four different aspects of design and technology:

- their own design and technology work as it proceeds — *on-going evaluation*
- their own work when it is finished — *summary evaluation*
- their own procedures — *procedural evaluation*
- the designed work of others.

More effective evaluation

So what is involved in evaluation in design and technology and what strategies can teachers use to encourage good practice? How can teachers move on from simply asking pupils 'What do you think of your model?' or 'How would you improve it if you could make it again?' and receiving the inevitably brief and unimaginative answers?

The key lies in another major skill used in designing and making which is closely related to the skill of evaluation. This skill, *specifying the purpose of the product*, is an essential precursor to 'making good quality products fit for their intended purpose' (DFE, 1992). It has, perhaps, suffered from neglect (especially by primary teachers) and yet, without it, evaluation becomes rather superficial and meaningless. In asking pupils to state the purpose for which their product is to be made and what they hope it will achieve we are asking them to set out the criteria against which they can later make their judgements. Once these criteria have been established the methods of evaluation follow naturally.

I recently worked with a class of Year 2 children who were involved in a topic called Summertime. Their task was to design and make a model of a picnic box using card strengthened with short wood strips. In the early stages I used a large sheet of paper and agreed, with the children, a set of criteria for the picnic boxes. The boxes should:

- be strong enough not to crush the sandwiches and fruit
- have sections inside to keep the various items separate
- have a carrying handle
- have a catch which held the lid closed securely.

Every so often, as work proceeded, we would look at our list of criteria as though it were a guiding light. Using the list, children would be constantly evaluating their work to ensure that it conformed with their original intentions. The children themselves added their own, often unspoken, criteria for success and made evaluations against these too. Some chose to have a compartment for a drinks bottle, others specified their own kind of decoration for the box. During their *summary evaluation* the children were able to say much more about the success or otherwise of their products because

they were looking at them with a variety of criteria in mind.

■ Do children set criteria naturally?

Constable (1994) suggests that children at Key Stage 1 do not 'automatically establish their own criteria for evaluating their work'. During a SAT which involved making protective headgear she noticed that the children were uncritical of the fact that the hats offered no protection from the sun or wind or rain despite the fact that these were clearly the criteria for success. I would suggest, however, that these criteria were imposed on the children within the testing situation and in fact the children probably had their own more realistic agenda which involved making hats for their own implicit purposes. These might have been that the hat should fit their heads, look good, involve using interesting, stimulating materials that they like to handle and so on. Clearly it is important that children are themselves involved in establishing the criteria by which their products might be judged.

Any design and make activity will be based on some kind of purpose which, in turn, will involve some criteria for success. These, in many cases, will be left unstated and may even be a little vague in the designer's mind. They may even change in the light of experience, as work proceeds. One Year 3 child I was observing began making a lorry for his mother

but soon changed his specification for the model when he found he could not obtain and fix on suitable wheels in the time allowed. Instead he made a model boat using strips of wood which he enjoyed cutting, and added features which he knew would please his mother.

It would be reasonable to assume that, in children's minds, unstated criteria exist which may, indeed, be changed as designing and making proceed. We can think of these criteria being related to three aspects of the work in hand:

- the function of the product
- the client for whom the product is intended
- the learning experiences which the pupil might want to have.

■ Objective and subjective evaluation

The teacher's task is to encourage children to be clear about their own criteria for the success of their own design products and then to relate these to any evaluation made. In a recent design exercise with a group of BA students based on a topic The Supermarket, they were asked to state the criteria for judging a variety of models they were about to produce. This was not an easy task at first, many of the criteria such as 'Safety' being too vague to be used for evaluation purposes. Through discussion it became possible to refine these

Table 1

Product	Criterion	Subjective methods of evaluation
Supermarket trolley	Should separate fruit and vegetables from rest of shopping	Success / failure judged by potential users of the trolley
A new cereal	Should look good	Judging panel gives score out of ten for each sample
Display stand for sweets	Should attract children	Observation of stand being used in the shop
Supermarket shopping bag	Should have comfortable handles	Ask a group of consumers to test subjectively and give opinions
		Objective methods of evaluation
Supermarket trolley	Should hold 500 cubic centimetres (scaled down week's shopping)	Find out how many centimetre cubes the trolley will hold
Design a new cereal	Should not contain any added sugar	Yes / No
Display stand for sweets	Should allow sweets to flow smoothly into bags	Test operation a number of times for reliability
Supermarket shopping bag	Should have comfortable handles	Measure the amount the handle of a loaded bag presses into a lump of Plasticine.

Table 2

Strategies for teachers to help children evaluate**General**

Value children's responses and opinions.
 Create an atmosphere of trust and respect for other's opinions.
 Help children to see that self-criticism is a virtue rather than an admission of failure.
 Give children time for reflection before asking for evaluations.
 Ask searching questions about the product and processes involved.
 Encourage pupils to ask their own questions by providing examples.
 Promote group work in making evaluations – sharing ideas leads to more objectivity and less sense of personal success or failure.
 Encourage oral responses where children find writing tedious or difficult.
 Provide tape recorders to increase motivation.
 Use a points scoring system for different aspects of a product; add the scores to get an overall picture.
 Provide evaluation sheets with focused questions to guide pupils.

Children's own products

Encourage children to be aware of the purpose of their designed product.
 Set criteria for children which they can use for their own product.
 Encourage children to set out their own criteria against which their products might be judged.
 Use any criteria established at the beginning in any formal evaluation later on.
 Discuss possible improvements to parts or all of the product.
 Develop ways of making subjective evaluations more objective, e.g. involve more people in the judgement.
 Use scientific testing to make objective judgements.

Others' design products

Encourage children to discuss the purpose for a product.
 Encourage them to put themselves in the place of the designer. Ask "What were his/her intentions?"
 Encourage close observation of the products of others. Use all the senses.
 Make observational drawings.
 Use aids to observation such as hand lenses.
 Help pupils to focus their observations on relevant parts of the whole.
 Compare items which have a similar function, e.g. different types of can opener.
 Identify mystery objects.
 Compare products from other cultures and times.
 Focus on the materials used for construction and why these, in particular, were used.
 Focus on such features as shape, mechanisms, use of energy and the way the product is controlled.

References

- Baynes, K., *Children Designing*, Loughborough University of Technology, 1992
 Constable, H., 'A study of aspects of design and technology capability at key stage 1 and 2' in Smith, J., *IDATER 94*, Loughborough University of Technology, 1994
 DFE, *Technology for ages 5 to 16 — Proposals of the secretary of state for education*, DFE, 1992
 SCAA, *Design and technology in the National Curriculum — Draft proposals, May 1994*, SCAA / HMSO, 1994

broad ideas and state them in more concise terms. It became clear that certain criteria would lead to subjective judgements while others would lead naturally to more objective testing. Table 1 shows examples of these criteria and the suggested method of evaluation.

Evaluating others' products

Design and technology is not just about pupils designing and making products, it is about their wider understanding of the designed world. Baynes (1992) puts it neatly when he suggests that '... a study of things which have been made will help us in our own design and technology work, but equally ... our own design and technology work will help us to understand things which have been made'. When pupils evaluate the designed products of others they should be encouraged to exploit the link between design specification and evaluation. Beginning with the question 'What

did the designer set out to achieve with this product?' will enable pupils to make sound evaluations later. It will highlight the fact that professional designers as well as the pupils themselves will begin with a purpose in mind and will have implicit or explicit criteria by which to make later judgements.

Strategies for encouraging children to evaluate in D&T

In the classroom teachers are beginning to explore in more depth how children evaluate their work and how this skill might be enhanced and encouraged. Table 2 shows a list of strategies that a teacher might employ to encourage effective evaluating by pupils. It is partly the product of a school-based assignment carried out by practising primary teachers on a 20-day course in design and technology at Warwick University.