

Quality in Design and Technology: What we should be looking for

The National Association of Advisers and Inspectors in Design and Technology

Quality looms large in design and technology teaching today. These guidelines, produced by the National Association of Advisers and Inspectors in Design and Technology (NAAIDT), illustrate what quality means in practice.

■ Introduction

This Association, which was formed in May 1991, supports the work of Local Authority advisers, inspectors and advisory teachers. Its objectives are:

- to provide a forum for the exchange of information and ideas between members in order to assist them in carrying out their professional duties.
- to make a contribution to educational research and development.
- to work with other agencies, both national and international, which seek to promote design and technological capability.
- to promote and disseminate good practice which illustrates a rigorous application of a design and technological process leading to *quality* outcomes.

As you will see the last of these objectives includes the use of the term *quality*. It is this word, and its interpretation in the context of design and technology that forms the focus of this guideline.

Design and technology (D&T) is concerned with designing and making products which can be tested and evaluated in use.

Designing and making should:

- be a practical activity
- encourage imaginative thought and promote enquiry
- apply scientific, mathematical, aesthetic and economic principles
- develop technical skills to produce quality solutions.

The products should:

- be tangible
- have a clear purpose and function
- involve the use of appropriate materials, selected for a particular purpose
- be of such *quality* as to be efficient in use and capable of being tested against specific criteria.

■ Quality

What, then, is meant by the use of this word *quality*? How do we, as teachers, advisers and inspectors recognise it when we see it? What should we be looking for? More importantly, what should we be doing to develop good quality work in our classrooms and practical areas?

We should remember that others also are looking for and at quality, some of whom may have differing views. To describe quality we might use words such as elegant and attractive. These are of course subjective terms.

Others might also use words such as ecologically sound, technically efficient and well engineered — terms which may appeal to some as offering more rigour and objectivity in assessment terms.

Terms such as flair and imagination could also often be used to describe work of quality. These are sometimes difficult to define, particularly for children whose experience of D&T may be limited, but not to do so would be a mistake. To say that you know quality when you see it is a cop-out. We have to be able to define it more closely.

Good quality teaching calls for:

- clear exposition of the design process
- adequate instruction in practical skills
- provision of good opportunities for pupils to observe the skilled use of resources and learn to handle them independently
- regard to Health and Safety
- planning to cater for the needs of boys and girls and those from all cultural backgrounds
- emphasis laid in each Key Stage on the need to produce good quality products
- opportunities to be taught to apply technological knowledge, discuss and analyse their work, justify the ideas, material and techniques they have used and to propose modifications and improvements.

Good quality learning means that pupils:

- continuously use and extend their knowledge, understanding and skills as they design and make products

- show curiosity in the investigation of the capabilities of different materials
- use an increasing range of techniques, processes and resources with confidence, showing creativity in designing products to meet particular human needs
- are prepared to persevere in the organising, planning and making of their products, evaluating them at each stage and testing them fairly against objective criteria
- are able to work both independently and as part of a team.

When considering to apply the term *Quality* to Design and Technology two distinct but closely interrelated aspects of the subject must be considered.

There are two sides to our work:

- *process* (how a successful outcome is achieved)
- and
- *product* (the outcome)

Looking at the quality of the *process*, this relates to the thinking and decision making and the actions planned and taken during the development of a product.

There should be clear evidence of pupils' thinking and decision making in the work which they produce. This could be in terms of annotated design sketches, notes, plans, models and test rigs. It will also be apparent in what pupils say. The evidence of *quality* of process will be in terms of reasons given for decisions made, evidence of planning and logical thought, application of prior knowledge, relevance of research and rigour in evaluating, testing and validating ideas.

Secondly there is quality of *product*. This can perhaps be more readily defined than quality of process, due to the nature of the evidence provided; a product is tangible and can readily be examined. Remember from our opening statement that D&T is concerned with designing and making products which can be tested in use.

Quality products are by definition successful: they do what they intend to do well. They are effective, efficient and acceptable solutions to perceived needs. To be effective they must meet a required specification: they do what

they are supposed to do. A specification leads to criteria which can be used to measure the performance of a product. To be efficient, they must achieve their purpose with minimum waste of material and energy: they are cost effective in terms of materials, environmental impact and time.

Finally they are acceptable. This has two aspects: acceptability both in terms of being manufactured to appropriate standards of accuracy, fit and finish and in terms of meeting aesthetic, social, moral and cultural prerequisites.

To explore the issue of quality further, we could look at some of the key activities which take place during a D&T activity. For example:

Exploring needs

Quality would be shown by:

- a *clearly stated problem*, appropriate to the Key Stage, with systematic identification of the appropriate sources or lines of investigation. Research will be purposeful.
- a clear *specification* which defines what the outcome must be like or be able to do.

Generating ideas

Quality would be shown by:

- a *broad range* of considered and relevant possibilities for development which are clearly referenced to the design specification.

Developing ideas

Quality would be shown by:

- a *rigorous analysis* of strengths and weaknesses in ideas in terms of *function* (how closely an idea matches in form and operation the requirements to be met)
- *technical aspects* (its use of appropriate materials, constructions and production techniques)
- *aesthetics* (its use and refinement [as appropriate] of shape, form, colour, taste, texture, proportion)
- *economics* (the suitability of the idea to its intended user, labour and the value added to the product by aesthetics or cost).

Communicating and presenting

Quality would be shown by:

- the *type of presentation* chosen for a purpose. Examples: a broad impression given by a freehand drawing or a precise understanding given by a constructed or computer generated drawing; statistical or comparative information given by graphs, spreadsheets and diagrams; three-dimensional modelling in place of 2D representations.
- the *accuracy of presentation* to ensure that what is conveyed is done to a necessary degree of precision.

Reviewing

Quality would be shown by:

- the *form and timing of testing and evaluation*: how these are used to inform designing and making and generating suggestions for alternative and additional work.

Applying scientific, mathematical, aesthetic and economic principles

Quality would be shown by:

- *how these principles are used to inform* the design of the product
- *how these determine the performance* of the product in terms of how well it performs, how it looks and what it costs.

Knowledge and understanding of tools, processes and materials

Quality would be shown by:

- the *range of knowledge and depth of understanding*
- the *ability to apply* such knowledge to a specific situation and make appropriate decisions
- the *ability to apply* knowledge and skills to a new situation
- the *ability to sort and order* such information.

Using materials, components and processes

Quality would be shown by:

- *precision* with which materials are cut, shaped, joined and combined and finished
- *refinement* in making or selecting detailed parts, components and fittings; in finishing surfaces.

Using energy and control

Quality would be shown by:

- *sophistication and efficiency* in the use of energy and the design, manufacture and operation of control systems.

Here we have shown how it is possible to offer more detail to the use of the term *quality*. The quality of the outcome depends, of course, on the quality of the process. The two together are dependent on the quality of the teaching and learning experience offered to a child in school.

Finally, what is the relationship between quality and the ten levels of attainment prescribed by the National Curriculum? Is there any? Perhaps not. A child working at level 2 can produce high quality work, as can a child working at level 8. But high quality work at level 2 does not make it level 3, 4 or 5.

For a list of other NAAIDT publications send sae to The Hon Sec. Mr. B. Welsh, 124 Kidmore Road, Caversham, Reading, Berks, RG4 7NB.

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