

Supermodelling! Developing designing skills at Key Stage 2

**Carolyn Chalkley
and George
Shield**

*Sunderland
University*

Abstract

The strategy of enhancing designing skills in children through their engagement in design and make tasks, whilst essential, is not sufficient. These transferable skills must be developed through a structured programme of activities which not only identifies and enhances significant 'sub-processes' but embarks upon strategies designed to link cross-curricular themes. This article discusses these issues and in particular:

- recognises that 'designing' requires knowledge in terms of 'subject content' as well as an understanding of design algorithms
- illustrates an approach which clarifies a significant design sub-process
- identifies cross-curricular themes
- suggests a strategy which can be used by teachers working with children at Key Stage 2
- discusses some of the issues raised

The article is based upon a short period of curriculum development carried out with a small group of children working at Key Stage 2. The work was carried out with children in Year 5 and spread over four sessions of approximately two hours each.

Background

"Standards achieved by pupils in specific lessons at Key Stages 1 and 2 are generally satisfactory, but overall standards of achievement in primary schools in design and technology are often low." (OFSTED, 1995, p. 3.)

Some would say that the faint praise delivered by OFSTED as a result of their inspections carried out during 1993 and 1994 is not surprising, but is a result of the confusion within the statutory Orders rather than any inherent deficiency within the teaching profession. Whilst this conclusion may be held with some justification it is still fair to say that much needs to be done to

ensure that design and technology is a worthwhile experience for all of our pupils.

When teaching 'technology' it is often forgotten that knowledge and expertise is required in understanding subject matter as well as giving children the opportunity to express their 'creativity'. Nothing can be designed without knowledge of materials, processes and scientific and aesthetic concepts and the difficulties experienced by novices can be attributed largely to the inadequacies of their knowledge base rather than their processing capabilities. (Glaser, 1993). Whilst these concepts can be taught during technology, they can also be enhanced by drawing upon knowledge gained elsewhere in the school curriculum.

Prior to this period of curriculum development it was evident that there was an underlying feeling held by teachers in the school that the design and make tasks undertaken by the majority of the children were somehow failing in the quality of the 'design' experience provided.

This feeling was not due to any apparent lack of planning or expertise on behalf of the staff in a school which has placed considerable value on the place of technology in the curriculum. Staff were disappointed to note that no matter how much effort was placed by them on the initial stages of design and make tasks, the 'designing' became a chore which had to be undertaken, in the view of the children, as painlessly as possible. This was achieved by employing as little effort as could be achieved without incurring sanctions and while covering the minimum requirements. 'Making' was the aspect which dominated technology and it was this component which generated excitement and interest.

This 'rush to make' created the impression, within the teaching staff, that important features behind the process approach were being lost. A strategy was decided upon which involved children in 'designing' through the manipulation of materials as opposed to restricting the activity to a paper exercise which in effect had historically created an artificial division between 'abstract thought' and 'practical making'.

It was with these thoughts in mind that an activity was planned for a group of mixed ability Year 5 children. During their time in school these children have had a substantial experience of technology. They were, for example, the cohort to sample the SAT in 1992 and were also the beneficiaries of an extensive period of technology INSET which had succeeded in raising awareness, confidence and enthusiasm of staff. It would therefore be fair to say that the group were, theoretically at least, reasonably well acquainted with what was expected of them during a 'technology session'. In practice, however, this proved to be an optimistic assumption. A large number of the children had still not appreciated the value of producing working plans and designs.

With these reservations in mind it was decided to initiate a design and make task within an embracing topic of 'growth' which called upon, in particular, cross-curricular links with mathematical work on solid shapes.

One of the problems faced by teachers during curriculum development is that the examples quoted give the appearance of being stage-managed, in that they are often carried out with small groups of children, and apparently require exceptional resources or highly gifted teachers. The following project was chosen to counteract this criticism in that it could be considered 'ordinary' or even mundane. It could certainly be handled within a normal classroom and teaching situation and was designed to draw out important features of a process driven approach to technology.

'Design and make a container suitable for the Easter Egg provided'. This task covered many of the points stated in the National Curriculum programmes of study, but specifically:

"explore, develop and communicate aspects of their design proposals by modelling their ideas in a variety of ways".

and also

"apply skills, knowledge and understanding from the programmes of study of other subjects, where appropriate, including art, mathematics and science." (DFE, 1995)

In so doing it was hoped to emphasise a successful outcome in terms of a finished product, but in addition encourage exploration of techniques directly relevant to achieving that end result.

Session 1

The task was piloted with a group of eight mixed ability Year 5 children.

The work was introduced to the children by following on with mathematical activities, which had been initiated earlier. This involved an analysis of solid shapes through modelling a number of examples in 'mouldable' materials, naming the geometrical solids and their parts and discussing their properties.

This was consolidated through the short practical exercise of making a cube from a printed paper net, enabling the children to begin developing the concept of modelling in three dimensions from two-dimensional sheet materials. This practical activity was intended to consolidate abstract thought through 'learning by doing' (an important component of a process approach).

The transition between mathematics and technology (if such a distinction is either desirable or evident in practice) could be said to have occurred during a short session involving the investigation and disassembly of manufactured boxes, concentrating on the differences they could see between these 'practical' outcomes and the more abstract 'geometric nets' which they had constructed previously.

Progression was then achieved through the 'general' of packaging to the specific of the task in hand, that of the Easter Egg. To facilitate this, the children were organised in small groups to brainstorm. By drawing upon their previous knowledge of Easter Egg packaging they compiled a selection of possibilities, which not only accommodated



Children considered how to make the Easter Egg containers both pleasing to the eye and attractive to potential customers

the egg, but also considered the aesthetic problems of decoration. The decoration not only included the consideration of pleasing the eye but also how to be attractive to a potential customer. The commercial aspect of marketing the product was an important consideration.

A pool of ideas now existed for individual children to draw upon. This strategy of using small groups for the learning process (as opposed to being a class management strategy) is increasingly recognised as a valuable learning experience within technology education (McCormick, 1993) and an approach which is considered valuable by the children themselves (Kimbell et al., 1992).

Session 2

The supportive activities helped a great deal in setting the scene for the children to begin their work and the children who were well acquainted with the mechanics of 'doing a design' began work. Their capabilities varied. Some included alternative ideas, different views of their chosen design and also measurements others required more help. Nevertheless a great deal of discussion was generated at this stage, initially concerned with decoration rather than the logistics of making. Gradually, however, it became clear to the children that transforming their ideas into practical solutions was not as easy as it first appeared.

Several children worked out their own methods of procedure such as:

- copying measurements onto the cardboard and building the net up line by line, but with associated 'angle' problems;
- cutting the design out and drawing around it;
- drawing freehand, using the paper nets as reference points.

At this stage it was obviously necessary to guide their discussion towards a method that would help them to visualise the complete box before a sense of failure crept in, and so the idea of using some of the construction or maths equipment available in the classroom was suggested. This suggestion was met with great enthusiasm and the children settled upon using 'Clix' (a mathematical kit of plastic shapes which when assembled and 'clicked' into position resemble three dimensional forms). The idea was universally adopted by the group and they quickly made suitable Clix boxes for the Easter Egg that resembled their designs quite closely. This strategy had two major advantages:

1. designs could be easily altered in terms of size and shape to accommodate the egg; and
2. once completed they could be opened out to reveal the shape of the net they would need to construct their own box.

From there the children still had the problem of drawing the net accurately, but with the Clix net to help they could measure, draw around and make comparisons as they progressed. Minor hitches occurred, such as forgetting to add tabs for sticking the net together and neglecting to score the card prior to folding, but these were easily remedied.

Session 3

The remainder of the project was completed with no further problems. The children by then were working in familiar territory i.e.

constructing and decorating their models to produce the finished article.

The end results demonstrated a great individuality and imagination in terms of appearance, but perhaps of greater significance in this exercise was the learning experience the children went through in order to succeed.

Despite being small scale, the activity illustrated that by careful planning and teacher intervention at appropriate times it is possible to incorporate concepts that may otherwise be lost. This is only one example of using construction kits as materials but in discussions with colleagues the further potential of this approach was identified. This potential, however, must be used with discretion. The possible shortcoming of the teacher being too prescriptive in the use of specific kits is recognised and the use of such design aids should be encouraged as a generic strategy, with the choice of the medium being discussed with the children as part of the normal teacher/child interaction.

Conclusion

Teachers are very skilful at deconstructing sensory motor skills and cognitive concepts related to established school subjects, so that their pupils can identify those components which form the building blocks of the concepts and skills they are attempting to enhance. In 'designing' this understanding is not so refined.

If the design and technological capability of children (and of their teachers) is to be improved, and not become either a subset of science or art and craft, specific strategies must be developed to identify appropriate design sub-processes so that techniques can be used by 'designers' but also as the first stage in the development of a pedagogy which is suitable for teachers in the subject area. Teaching and learning are very complex activities and never more complex than in an area which demands such a wide range of subject knowledge and also pedagogical skills from its teachers. Curriculum development aimed at enhancing technological abilities must attempt to address fundamental educational

concepts as opposed to providing short term strategies for specific tasks. We hope that we can contribute to such 'second generation' strategies of technology education which will provide a focus for using, selectively, those learning theories which are effective in enhancing the problem solving skills thought so desirable.

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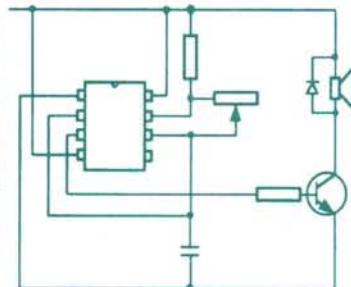
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