

Generating Designs at Key Stages 1 and 2

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The work described below was part of a Design and Technology course being run for primary teachers in Somerset. The course is a joint venture between the Somerset LEA and Bath College of Higher Education. LEA advisory and support staff are tutoring the course together with a College lecturer. The course includes some innovative aspects and involves participants in working collaboratively in pairs and with children during school-based sessions. These sessions provided participants with an opportunity to reflect on their role as teachers of design and technology by looking closely at how they interact with children and considering ways in which that interaction and consequently their practice as teachers can be improved.

A key concern that arose during the first term of the course was how to support children in generating designs (Attainment Target 2 of Technology Profile Component in the National Curriculum). It was evident that to some primary teachers generating a design was being reduced to 'draw it before you make it' and if children were encouraged to *image* possibilities it tended to happen only at the beginning of an activity. The tutor team decided to focus on this during a centre-based day and school-based sessions. The aims were to broaden participants understanding of imaging and design generation and encourage them to appreciate the importance of developing creativity in children. A full day was spent introducing the course members to the nature and importance of imaging or 'seeing in the mind's eye' and concrete modelling through an activity based on 'personal spaces'. They engaged in structured imaging activities (eg imaging a favourite place and then changing its colour and manipulating it in other ways) and then used a variety of different media to externalise the 'imaged' design proposals in order to modify and develop them. In other words they were asked to make their ideas 'visible' through the manipulation of appropriate materials such as textiles, resistant materials or graphic media. Throughout the work the interaction

between thought and action and the use of cognitive modelling for manipulating, changing and developing ideas were explored. By the review session at the end of the day individuals had produced an impressive range of designs ranging from computer generated graphics to 3D models.

Generating design with children

As a result of this experience the teachers, in pairs, were asked to plan work for a small group of children, which involved the children in generating designs for play areas. It was decided that all the teachers on the course would work in one school for a morning. We negotiated access to three age groups with a local school. The task, for the children, was contextualised in terms of providing ideas for a local group who specialised in making play areas. It was considered important that the children responded to the task as a purposeful one but did not have an expectation of seeing their designs immediately implemented. The teachers had the choice of three age groups (R, Y2 and Y5) and were asked to decide on a medium to use (graphics, clay or recycled/resistant materials). It was hoped that the day would provide some insight into the progression involved in generating designs and into the advantages and disadvantages of different media. Each pair worked with the same group of four children for two sessions (45 minutes and an hour) with a playtime in between to allow plans to be modified. Generally, one course member worked with the children whilst the other observed and collected evidence for later analysis. The first session concentrated on orientating the children to the task and on encouraging them to image possibilities. They were then introduced to the specific media and supported in their attempts to realise and develop their ideas. There were obvious disadvantages to restricting the children to a specific medium, but it was done to provide the teachers involved with an opportunity to reflect on the appropriateness of each. Pairs collected data in a variety of ways including field notes, audio taping and

video. All the outcomes of the children's activities were retained for later analysis (and then returned to the children).

Analysis of work with children

After the morning's work with children, the teachers spent the afternoon at the Education Centre analysing and reflecting on what had happened. The pairs were asked to analyse the data they collected using the following questions:

The nature of the children's imaging...
How did the children respond to the imaging activities?

What was the nature of their initial imaging?

How did their initial ideas change and why?

Were the children 'imaging' throughout the time spent generating design?

What teaching strategies were used and how effective were they?

How did the children respond to the teacher's questions/suggestions?

Response to the media used...

What were the advantages/positive aspects of the chosen media?

What were the disadvantages/concerns that arose?

Nature of the outcomes of design generation...

What features did the outcomes have?

Did the outcome involve the child as a participant?

The social context...

Was there evidence of collaboration/copying/discussion?

Did any gender issues arise?

Was there evidence that the children were generating designs?

Some tentative conclusions

The analysis and the resulting discussions provided some fascinating insights and raised some interesting issues. The following account draws particularly on work done with the Y2 age range but includes examples drawn from the other two age ranges.

Children imaging

Some children found imaging and articulating their imaging difficult and teachers found it essential to reassure the children that their own ideas, however unusual, were acceptable. The importance of the relationship established between teacher and child was evident and those teachers who had spent time getting to know the children proved more successful in eliciting children's ideas. Several children were strongly influenced by television images and themes such as 'Teenage Mutant Ninja Turtles', 'Starship Enterprise' and 'Fun House' were used. These TV influenced images tended to be very dominant and resistant to change even when encouraged by the teacher to consider other possibilities. They also led to some designs that had 'story lines' and involved the child being part of the story. These children seemed to find it harder to separate themselves from the design outcome. A more positive aspect of these images was that they tended to be holistic and did not lead to disjointed elements.

Indeed, a general point that arose during discussions was the importance of encouraging children to image in an holistic way and then, if necessary, encouraging them to focus in on more specific aspects as they work on their designs. Linked to this is the need to encourage children to image throughout design generation and later stages of design and technology work. It became clear that successful design generation occurred when children were encouraged, sometimes quite systematically, to revisit their images and articulate how they had developed or changed their ideas.

A surprising element of children's imaging, in this particular work was the significance of smell. For example, a feature of the 'turtle sewer' was its pizza smell and another Y2 child designed a 'mint' playground which gave off strong smells as equipment was used.

Children's images were often strongly influenced by colour and themes including a 'multicoloured play park' and a 'magic park' that included 'colour'

areas. This aspect was best developed by children who used graphic media and even the younger children's designs often used colour effectively and occasionally in an abstract way to convey feelings (as in a violent element of the 'Fun House' design).

Using graphic media

Those children who used graphic media produced outcomes that could be grouped in the following way, which may indicate one aspect of progression:

- a. picture that includes 'me';
- b. picture of the whole design without 'me' included;
- c. picture of disjointed elements;
- d. diagram;
- e. annotated diagram.

There were some interesting aspects of these features. Younger children are obviously more likely to include themselves in the picture. Some very young children produced designs that were simple but included novel and unusual elements. For example, Natasha (Y2) imaged a 'pink' swing that gave off 'a fresh smell like clean washing' and swung 'really high'. She retained this strong image throughout and produced a pencil drawing of herself on the swing. Initially she was reluctant to erase a part of the drawing she did not like and had to be reassured that changes were acceptable and indeed desirable. She used colour with purpose for the swing but then started to colour in the sky and grass. This happened in a number of cases where simple designs were involved and suggests that the children had forgotten the purpose of the work. They were producing finished works of art, rather than designs. There were several examples where it became clear that the children were not generating designs but producing art work representing a known play area. Perhaps there was a need for the teacher to suggest, at the outset, that they should try and come up with original or new ideas. Similarly, when they reached the stage of colouring in, simply

'to finish a picture' rather than enhance their designs the teacher could have intervened and discussed the stage of the design process that had been reached.

The more sophisticated the design, the less likely it was to include 'me' and diagrams rarely included 'me'. Those children who described a clear initial image tended to produce more holistic designs. However, those who did not have a clear image of the whole design at the outset tended to illustrate some elements of a design, usually along the bottom of the paper. As they were encouraged to develop their ideas as a result of teacher intervention they tended to add new, but often unrelated elements, to the picture. These were consistently added to the top of the paper and so they ended up with a picture consisting of several separate elements.

Some children lacked skills with the particular graphic medium chosen (eg paint) and this meant that they often lost their initial image whilst they came to terms with the medium and the skills to manipulate it. Some children lacked ideas about how media like paint could be used and this was another reason why some Y2 children ended up producing pictures rather than designs. Paint proved to be the least successful media with these particular children tackling this task.

Using resistant/recycled materials and clay

It became apparent that children were radically changing their initial images when they were asked to use resistant materials to model their ideas and they needed to be encouraged to reimagine possibilities after they had had time to explore the materials available. It was still, however, felt desirable to encourage imaging without thinking about the constraints imposed by the media used. Some examples of recycled materials leading to improved designs, where the shape of something suggested a new possibility, were found. Clay (and graphic media) led to children being less likely to change their initial ideas significantly.

Resistant/recycled material and clay also avoided the inclusion of self in the design and it was suggested that it might be desirable for a child who regularly includes themselves in graphic designs to be encouraged to separate themselves from designs more effectively by using another medium, such as clay.

Clay was found to be an excellent medium for design generation with Y2 children and did not lead to the frustrations some teachers anticipated in terms of children not being able to realise complex ideas in a concrete way. The children had used clay before and so did not lack manipulative skills. It had numerous advantages including allowing texture to play an important part in the design. These children found it easy to make changes and did not show any inhibitions in making changes, which contrasts with some of the graphics group. One particularly interesting design started off as a 'heart-shaped' room for sports activities (influenced by a TV campaign for fitness that stressed it helped prevent heart diseases). After further imaging this became a 'heart-shaped' sports' centre that contained numerous similarly shaped areas. The only problem experienced by this age range when trying to realise designs with clay concerned the net for a football goal.

However, younger children did find clay more frustrating in terms of translating their imaged ideas into something concrete although they enjoyed working with it. They changed their original ideas quite a lot as they explored the clay. They managed to find a lateral solution to the problem of building large structures — they included the clay tools in the models! Some of their design models were flat and almost two dimensional. They tended to focus on one element of the play area rather than image and design the whole area. The designs of the Y2 children, by comparison, were more sophisticated and complex.

The 9 to 11 year olds had also used clay before but some had limited skills which

meant they found it difficult to communicate their clearly imaged ideas using clay. These ideas often had details and dimensions that could not be expressed easily in clay. Interestingly there was evidence of 'elemental' designs with two girls in this group. They had added new elements to their designs as a result of teacher intervention but these were not integrated into the overall design but added to the model as an obvious after-thought. This produced similar designs, in terms of a collection of separate elements, to those already discussed that were produced using graphic media. The more sophisticated examples produced by this group included a complex building with a removable roof showing considerable detail of the interior. The idea of the removable roof was suggested by another member of the group and readily adopted by the 'designer'. This leads to another important dimension of design generation in the classroom — what influence do other children have on individuals when they are generating designs?

Social context of design generation

Some interesting situations arose related to collaboration and copying. All the children were encouraged to work individually on their designs but to discuss their ideas with other children and the teacher. In one pair it became apparent that one child was simply copying her partner's drawing and when questioned appeared to have few original ideas. The teacher decided to separate the pair by asking them to come up with some original ideas, whilst sitting on different tables, and then share them. The 'copier', when liberated from the pairing, suddenly generated lots of original ideas for her design and when, fifteen minutes later, they shared developments she had far more to contribute to the discussions than her initially more dominant partner.

Another child became totally absorbed and refused to discuss his ideas with other children. He had a very fixed idea concerning a 'snapshot' scenario in which he was playing football with two named

international stars. His graphic outcome was inevitably one that included him in the picture! It was only as a result of teacher intervention about what he might do at half-time that he reluctantly considered other possibilities.

There was some evidence of gender related differences to outcomes. With the Y2 age group the girls produced more traditional playgrounds and parks with a variety of different play equipment. It was boys who produced play areas with themes. The boys also included more 'scientific' and 'technical' elements in their designs, such as pumps for a whirlpool, a computer to control a spaceship simulator and robot turtles to play with (if the real ones needed a break). The boys graphic designs were more often diagrammatic whereas nearly all the girls in the Y2 class produced pictures (of which only a few included labels). Only the boys included any 'violent' elements in their designs and all the TV themes were used by boys.

Conclusion

With all age groups and with any media it became clear that the quality of imaging and design generation was essentially dependent on the skills of the teacher. Asking the right questions at the right time, providing space and time for the child to think and to explore and creating an atmosphere in which the child can feel confident enough to express tentative and very personal ideas are all crucial for successful design generation. The exploration of children generating designs described above provided us with some insights but left us, inevitably, with more questions than answers. The teachers on the course are now exploring these issues in their own classrooms and will be discussing their findings during later sessions of the course.