

Abstract

At St John's C of E Primary school I teach a Year 3 class. There are 32 children in the class and design and technology is taught on a revolving programme. Once a half term the students are taught either design and technology for six weeks or a module of ICT. To make the most of a planned 'Science Day', it was decided to integrate design and technology with science. After discussions with the class, circuits emerged as a favoured subject. The Lighting it up Scheme of Work seemed appropriate, so it was adapted to fit in the day's schedule. This paper looks at how the day was planned, what the children achieved, and considers ways of improving future events.

Introduction

The school presently employs a part time teacher who teaches all the design and technology schemes/topics to the four junior classes. As the class teacher for Year 3, I therefore do not teach design and technology. Instead I take half my class for ICT, whilst at the same time the other half are taught by the part time teacher.

I decided that the best way to carry out the work would be to incorporate a project of designing and making into a planned 'Science Day' event which the school had decided to take part in, as part of the year of science, integrating the two subject areas into one event and project.

It makes learning more holistic, and reduces stress on individual subjects enabling more effective instructional activities. (Zuga, 1988: 56)

So to set the scene, the planning, delivery and evaluation of a substantial design and technology activity being the criteria for the coursework, was in my case a whole day event, from 10 in the morning until 3.30 in the afternoon.

Planning

Issues taken into account

What sort of designing and making activity could the children do which could be accomplished over a day's worth of lesson time?

- A project that needs to be linked into an area of science, so that the science co-ordinator would be happy that class three were meeting the criteria of the planned day's event.
- Ensuring the class wouldn't be covering a topic that had already been met this year by their design and technology teacher.

- Needing enough resources available for the class, with the whole school using the science resources over that day.
- Finally, to choose a project that needs to challenge the children and also build upon skills that they have previously been taught before.

One of the benefits of integrating subjects is that it enables children to study the same concept or skill from differing viewpoints and subject disciplines thereby reinforcing understanding. (Johnsey, R., 1999: 68)

Two weeks before the big day

The children in the class were very excited when I discussed the idea of devoting a whole day to design and technology and science. This sort of day was highly irregular at the school.

I really wanted the ideas to come from the children as to what we could do. I thought it best that they could work in groups to brainstorm what science topics they have covered and what making activities we could do related to these. We listed some of the science topics covered in Years 2 and 3 on the blackboard.

Shadows and puppets, plants and greenhouses, floating and sinking and boats were some of the ideas that the class came up with. The one idea that most of the children seemed to agree that they liked best was using circuits and making some sort of light/lamp design to house a light source.

design and technology fosters learning to design and make, but also learning to design and make. It seeks to stimulate both intellectual and creative abilities and to

Samantha Leigh

Figure 1.





Figure 2.

develop personal qualities. (Breckon, A., 1997: 13)

So it was decided that in two weeks time the children would have a design and technology with science day when they would build a circuit and some form of table light/lamp.

I found that this project mirrored some of the aspects found in the Lighting it up 4E QCA Scheme of Work.

In this unit children apply knowledge about electric circuits that they have acquired in science in a purposeful way. They will learn to make something that will shine e.g. a table lamp.

QCA Ref: QCA/00/491



Figure 3.

Qualifications and Curriculum Authority (QCA) 2000i

Children enjoy making things light up and this unit gives them an opportunity to enhance their knowledge and understanding in using electrical circuits. When designing and making a product incorporating a bulb they will need to focus carefully on the purpose of the light and on how it will be controlled.

DATA, *Helpsheets*, Lighting it up Unit 4E.

I decided to leave the switches part out of the work for this project, due to the time constraints. The students could do that part in Year 4, based on Christmas lights or a poster lighting up; it would be more appropriate to incorporate that aspect later in their education.

The children had not been taught about circuits since they were in Year 2, so I needed to plan a lesson when the children could recap on their previous knowledge about electricity and making a circuit work in order to light up a bulb in our case. By the end of Key Stage 1, children would need to have covered the following in regards to knowledge on electricity and circuits.

Science Key Stage 1 Sc4 Physical Processes

Electricity

- 1 Pupils should be taught:
- b) about simple series circuits involving batteries, wires, bulbs and other components. (QCA, 1999)

As a focused practical task, I used a science lesson the following week to look at circuits again. I got out wires, bulbs, and batteries with examples of circuits made up which worked and some that did not to test. The children remembered a lot from the previous year and they could explain how a circuit could be made up and which pieces needed to join together.

When the children came to make their lights/lamps that they would not need to include a switch in their design and product, but the children would instead detach the crocodile clip from the battery mount/holder, to turn the light on and off. I wanted the emphasis of the day not necessarily to be based on the science of circuits but on the designing and making of the light. The timetable restrictions meant that we might not have enough time.

The school had only this year moved to using QCA schemes for design and technology and previously in Key Stage 1 the children's experience of design and technology had been:

- construction kits – to make vehicles, outdoor play equipment and strengthening structures to take heavier loads
- paper/card – pop up cards and puppets for a story
- food – making cakes and preparing food
- structures – making a fence and a ladder for Old McDonald's farm
- mechanisms – hinges for doors and windows
- textiles – using binka, stitching and sewing and making a hat.

According to assessments made by their teacher who takes Year 3 for design and technology, the children in my class had a reasonable level of skill and knowledge in designing and making. They could generate their own ideas and then suggest ways to develop these. They were generally able to select the tools and materials they needed for an activity. Measuring and marking, cutting and shaping the materials were ongoing skills that through design and technology they were continually refining.

I wanted to spend more time on evaluation of the product made, by the processes that the children had used and how these could have been improved.

Children were asked as homework to cut out designs of lamps and light fittings etc. that they could find in magazines and catalogues.

These would form the basis of our background research.

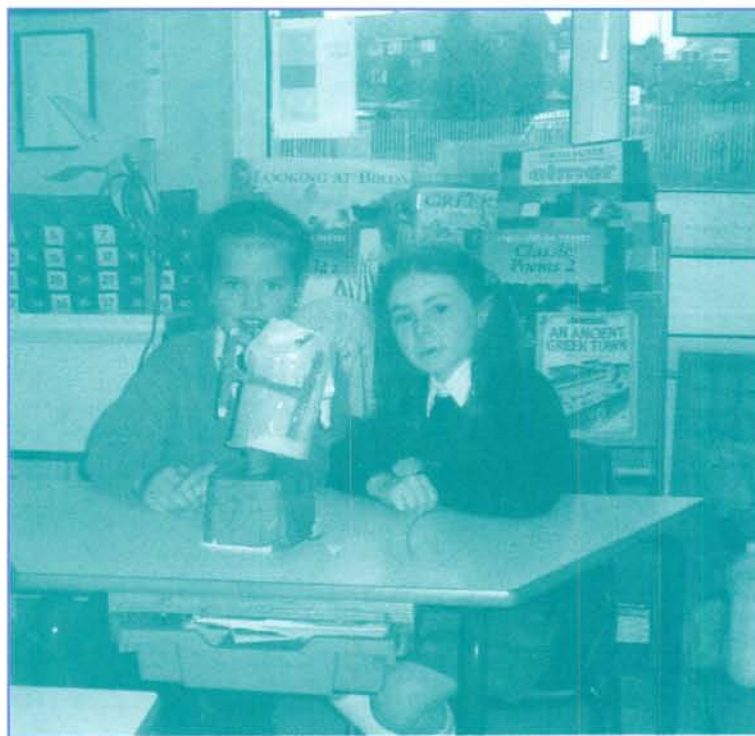
Delivery

On the morning of the school's science day, the children got into their pre-arranged pairs. The pairs were their own choice and not decided by me or based on ability. Each child was then given a pack of worksheets to complete through the various stages in the day. See Appendix 1.

The children were given a design and make outline, they were to create a light/lamp that would:

- work, i.e. the light would come on
- a design for a particular person, age specific
- a design to fit a particular room, e.g. a bedroom or lounge.

Anything a child designs and makes should be worthwhile with a clear purpose. (Barlex, D., 1997: 54)



am: before first break

Figure 4.

The second focused practical task was involved in using the magazine cut outs of different examples of lights and to choose a favourite design out of these. We did this as a gathering of ideas stage, to look at products available on the market, in order to help the children with a focus or design for their own light.

Figure 5.





Figure 6.

As a class we had already discussed what, where and who the light would be for. Some children choose to create a lamp for a child's bedroom, some children choose a lamp for a lounge that a mum or dad might like. There were many different ideas amongst the class, but a very definite design focus.

Figure 7.

So before break time we completed sheets one and most of two, which were based on what



would be needed to create a circuit for the light to work.

The children had an IDEAs task to complete which was to create a circuit. I had an educational assistant in with me for the morning and we went around the room asking the pairs to show us how to make the circuit, explaining how this worked and then showing us that it worked. Children worked in pairs of mixed ability so that they could assist one another. This also helped with reading the text on the pages.

am: after first break

When we arrived back after break we started on sheet three of the day's pack. This is where the children decided what their design would look like, what materials they needed and why they choose this particular design. Mrs Clarke and I went from group to group questioning the children about their ideas.

- Size.
- Choice of materials, reclaimed etc.
- How they would join materials together
- Where the circuit would be positioned.

This way we attempted to counter any problems that could occur in the making session, through discussing the pros and cons of the designs.

We need to challenge children's thinking and make them more aware of the factors influencing their judgements.
(Allison, 1999: 31)

The children had the last 10 minutes before lunch to gather the materials and tools they would need that afternoon, during the lunchtime groups came with me to collect any other materials that they needed.

design and technology is about making things that people want and that work well. Creating these things is hugely exciting: it is an inventive, fun activity.

James Dyson, Chairman, Dyson Ltd
(National Curriculum 2000, DfEE and QCA, 1999)

They were very much excited and eager to begin. The afternoon would be basically where the children could realise their ideas by making their lamps.

pm: after lunch

The afternoon went very well, the children came in eager to start. All the materials, circuit components and joining adhesives and equipment were available and ready to be used. I was on my own during the afternoon. So the children got on and came to me as I

circulated the room with questions or demands for help.

I found that the children when in pairs worked together to overcome difficulties and were willing to offer and take advice from friends around them. Figures 1, 2 and 3 show the children working during this time. They all appear to be on task, unless they are looking at the camera.

As one can see from the photographs the children have different ideas and have used various materials, but mostly reclaimed materials used as their structures for the lamps.

The hardest objective for the children, was to include the circuit into the design, where to put it?

Some of the children decided to hide the battery holder within the lamp (see Figures 4 and 5) others created casings for the batteries outside of the actual lamp (see Figures 6 and 7). The other children just left theirs in view outside of the lamp. Some of the pairs did comment during discussion that if they had had more time, they would have thought of an idea how to put the battery holder and wires inside their lamp, similar to lamps it is possible to buy on the market.

The bulb itself, most children wanted at the top of their lamp. How to fix this into position created a problem for some children to unravel. See Figures 8 and 9, Dale and Richard's worksheets. These two boys had a real dilemma at one point and one of the boys all but wanted to give up. They couldn't work out how to put the bulb into the bottle, and fix it near the top. Looking through their plans, their ideas are very good and their designs show thought. Richard's plan has included the lollipops as the platform for the bulb holder. They could not see how to get the lollipop sticks to stay in place. After a group discussion with others around the table and a little prompting, the boys cut holes in the bottle to balance the sticks on and they carried on much more enthused.

Using tissue paper and gum paper to decorate the outside of the structures to make them more aesthetically pleasing and more in the appearance of a lamp was an area most of the children were pursuing.

This caused problems to some of the children. A couple of the pairs went straight ahead and added all the decoration before putting the circuit in place. This caused some to take apart the decoration again so that holes or cuts could be made and the circuit installed inside, then redecorated.

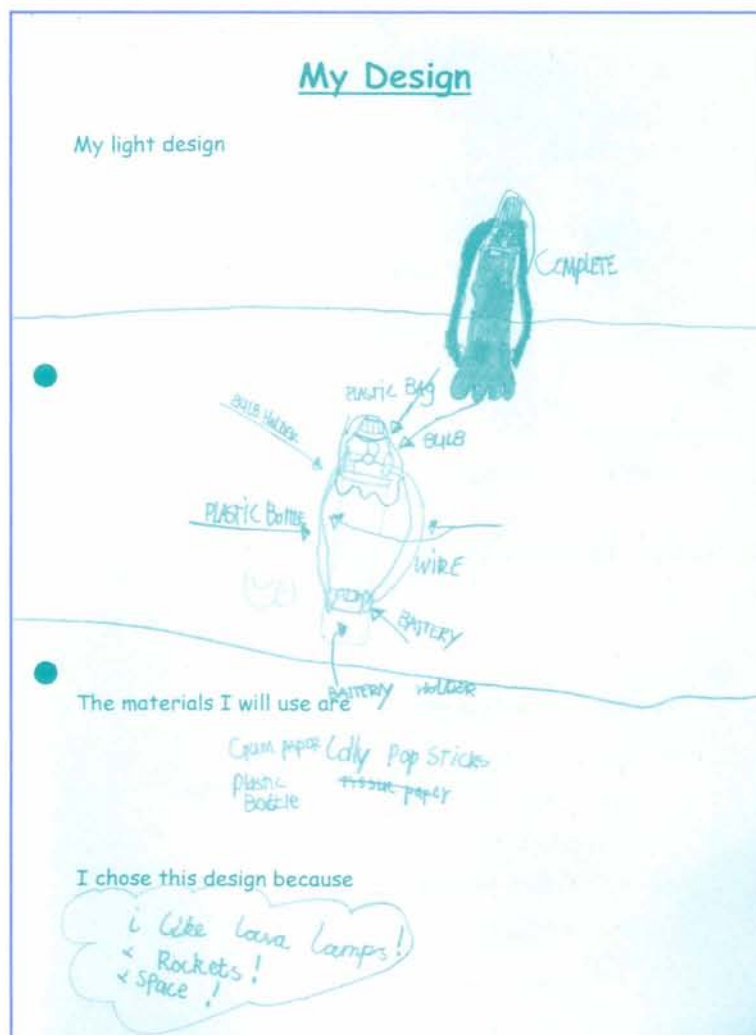


Figure 8.

The two children here were a little rushed at the end (see Figure 10). They wanted to take all the decoration off at the end of the afternoon in order to put the circuit inside. They then took it all apart again to change the place of the circuit because they found they couldn't turn it on and off. Jessica was unhappy with the look of final product and said on her evaluation that she would change everything. This I think was due to rushing into the making and not thinking logically what needed to be done first?

She was happy with the work she and Finley had done during the day and could understand why it hadn't worked out the way she had wanted it to. She and Finley had plans for how to change it; time ran out with the bell ringing.

Children's own evaluation of their work

Dale and Richard were both happy at the end of the afternoon with their final piece, and both had evaluated their lamp and said that there were things they would change. As can be seen from the responses to the final question, if I did the product again I would?

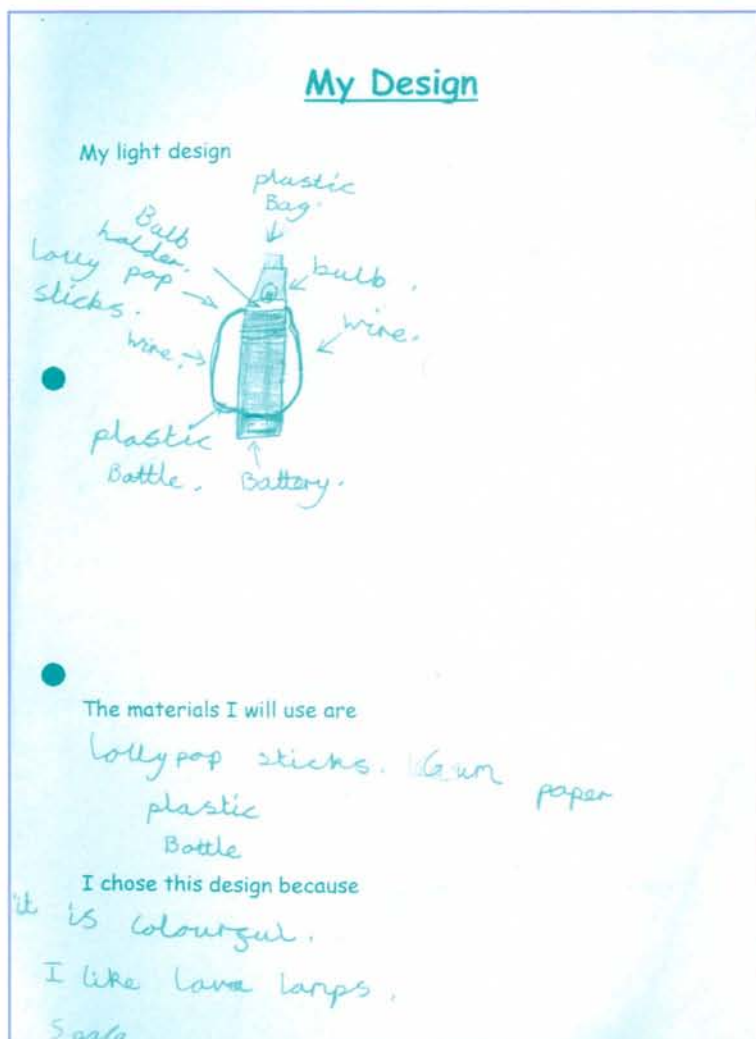


Figure 9.

Using paper to decorate the lamp was Dale's idea but it had to be removed when the lollipop sticks were inserted, he wasn't entirely satisfied with the look of the lamp at the end. Richard on the other hand was happy with the lamp and wanted to add a switch to the lamp.

Eleanor and Ruth (see Figure 11) highlighted a common comment that some of the children voiced. They would have preferred to look at more designs of lamps before they started. Or have an actual lamp to touch and take apart. This they said would have enabled them to think about their design in the earlier stages.

The two Thomas's had thought about their design before the day began and Thomas C had brought in the margarine tub as the shade (see Figure 12). They discovered that their tub was so big that the bulb used could not produce enough light to make an adequate shine. In both their evaluations they mention using a smaller tub. This they believed would have produced a better shining lamp.

The adding of a switch was common in a large number of the evaluations (see Figure 13) Harrison and Sam both enjoyed the work, but these boys wanted to push themselves further and felt having a switch on theirs would have made it a better piece.

Sophie and Andrew (see Figure 14) also wanted to add a switch to their light. I particularly liked the way these two created the frame for the bulb holder to sit upon. Sophie wanted to cover the bulb with a lampshade of tissue paper. The final lamp wasn't quite how she thought it would turn out but she and Andrew were really pleased at the end of the day.

Kate and Hannah were really impressed with themselves and what they had made. Hannah writes, 'I thought it would look rubbish, but it turned out to look brilliant.'

Her comment summed up what a lot of the children felt, in some respects. Most were really impressed with their end result, praise by other children and me, as the teacher, gave the pairs a pride in their work, and a feeling of accomplishment.

My evaluation of the day

Evaluating the day myself, I was extremely impressed with my class at the way they were so enthused with the activities. They all worked very hard and managed to complete their worksheets with their ideas and designs. The work was well within the children's level of ability, but it also allowed for children to experiment and progress further if they needed too, mainly with the outcome of their designs and the lamp produced at the end of the afternoon.

I needed to restrict the amount that the children could do from the Lighting it Up unit, in order to fit the work into the time frame of the day. There are areas now, when evaluating the day, I would have done differently. I feel that this is always the case when you try something new for the first time with a class.

The main point I need to remember is that this design and technology project was covered over one day. Not during a six week block where problems that may arise in one week can be sorted out before the next lesson, in the next week.

If I were to do anything differently I would have had another IDEAs activity, for children to take apart lamps and look at how wires and bulbs are fixed into position. This couldn't have fitted into the day, due to time. I could have done this before the Science day in a similar way to the circuit's lesson I built into my science scheme. A number of children did

struggle thinking how to fix their bulbs into place, this may have been alleviated by doing a 'looking at a lamp' session.

Fixing bulbs into place gave some of the pairs' problem solving tasks. Some children used lollipop sticks, others using toilet rolls, cut grooves in the side and bent in flaps. These the children found the bulb holders could balance on. The other groups picked up on this idea quickly and used it themselves. I was happy with the way the children worked co-operatively together.

Some of the children wanted to work with switches, to develop the lamps further. If this were not simply a day of design and technology, I would have thought about progressing on to adding switches as many children felt this would have completed their design. Time did not allow this on this occasion unfortunately.

The children nearly all commented on what an enjoyable day they had had and even though they had come up against problems they had enjoyed the challenge of working them out. There was not one pair who was not proud of the work they had achieved which made me happy. I was really pleased with the way that the children could evaluate their work. They could see the good and also see where changes could be made if they were to do it again.

It's easy to say that if I were to do this again I would change the time frame and work the scheme instead over a six-week block rather than over a day. I personally feel that I am happy that it worked as well as it did, being fitted into a 'day of design and technology'. The children produced some fine lamps that met the design objectives they set for themselves before they started – a lamp designed for a particular person and to be used in a particular room.

Is a quality, finished product the most important aim or is it the learning that goes into producing a product, in this case a lamp?

I believe that the children learnt a great deal during the day about working together to leap across hurdles that their designs created, problem solving, to produce work of good quality of which they can be proud.



Figure 10.

Figure 11.

Figure 12.

My Design

My final product looked like this



The materials I used were

card, cardboard, paper,
plastic.

I think that my final product was

If I did the product again I would add a switch to my wire

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Figure 13 and 14.

Appendix

My Design

Before I being this design product, I need to look at different examples of lights, here are some lights already on the market.

My favourite light is this one because

1

My Design

I need to use electrical components in my light design so my lamp will light up, I will use

I put these together to create a circuit within my design, this is what my circuit looked like.

2

My Design

My light design

The materials I will use are

I chose this design because

3

My Design

My final product looked like this

The materials I used were

I think that my final product was

If I did the product again I would

4