

# **Combining design & technology Unit 3D Photograph Frames with art & design Unit 4B Take a Seat**



**Dr David Barlex, Nuffield Design & Technology**



# Combining design & technology Unit 3D Photograph Frames with art & design Unit 4B Take a Seat

Details from a small scale pilot

A small primary school in the North West of England piloted the combination of the design & technology Unit 3D Photograph Frames with the art & design unit 4B Take a Seat. The teacher was supported by a classroom assistant. The teaching of the unit was completed in a two and a half days and was carried out by Year 4 pupils.

## **A collection of images and accessories**

The teacher and the classroom assistant had prepared a large display about both photo frames and seating so that the children would realise there was some connection between the two activities. Before the work began the teacher had asked the children to bring in from home images and other items associated with a favourite person. The resulting favourite people covered a wide range – football players, cartoon characters, film and book characters. The class discussed these briefly and the teacher established that none of the items was so precious that it could not be cut up or glued into position onto a card frame. All of the images were from easily obtainable popular magazines so this was not a problem.



Figure 1 *A combined display for a combined unit*

## **Thinking about the mask**

The teacher drew attention to the photo frame display and also showed the class a mask through which pictures could be seen. She then asked the children to draw the mask that they would use to show pictures of their favourite person. The children had little difficulty in complying with this request using a variety of different shaped windows arranged in different ways.

## **What about stability?**

Then the teacher introduced the problem of the frame falling over. What could be done to stop this? The initial responses included papier maché and crinkly paper. The teacher suggested that these might make the frame look more attractive but questioned whether they would help it stand up. Then a pupil suggested they could add another piece of card. The teacher said that this might work but to find out exactly how to do it they would need to investigate. She gave each pupil some card and scissors and asked them to make different ways of getting the card to stand up straight. Most pupils generated a single idea to which they became very attached. One pupil developed four different solutions but she was an exception. The teacher introduced the idea of a simple blowing test to check whether the proposed structure was actually stable. The teacher collected together the work and used a question answer session with the class to identify the different sorts of structures that they had developed and to discuss which ones worked well and which did not. These are shown in Figure 2.



Figure 2 *Different solutions to the stability problem*

Several problems emerged from this investigation. Simple solutions can be achieved simply by folding the card. Thin pieces of additional card can be used as props. But there are problems when these are not stiff enough. The situation can be improved by adding a tie between the base of the frame and the base of the prop. The point of attachment of the prop is important. If it is too low the card of the frame flops backwards causing the whole to fall over. The need for careful scoring before attachment of card to be used as props or ties needs to be emphasised and might need practicing by some pupils.

### Developing the masks

The teacher explained to the class that cutting out the masks they needed to act as windows for their pictures might be tricky so it would be a good idea to practice cutting out the shapes they needed. It was indeed the case that many children found this difficult. They had lots of previous experience of cutting out around the outside of a shape but cutting around the inside of a shape to leave a hole was much more difficult. Starting off is particularly tricky and they tried the technique of 'stabbing' with a pencil onto the place where the cut would begin with the underside being supported by a blob of blue tack. The typically round ended primary classroom scissors did not lend themselves to penetrating the small hole. In many cases the teacher and classroom assistant had to start them off but even then some children produced a cut that was uneven; a series of short jagged cuts. Small circles proved particularly tricky.

Examples of practice masks are shown in Figure 3 and Figure 4.



Figure 3 *This practice mask illustrates the difficulties faced by many pupils*



Figure 4 *This practice mask shows considerable skill*

### Designing and making the photo frames

Now the teacher set the class the task of producing the finished photo frames.

Despite the best efforts of the teacher and the classroom assistant to get pupils to reconsider their approach to making the photo frame stable a significant number of children insisted on staying with their first idea for making the frame stand up although the blow test showed that it was not as effective as it might be and that there were other solutions available.

### The children's products

Examples of the children's photo frames are shown in Figures 5 – 9 with comments.

- This is work from a very able pupil.



Figure 5a *Folded over to provide stiffness and the prop cut out rather than added on*



Figure 5b *The prop supports the frame well*



Figure 5c *Considerable visual sophistication*

This is exceptional work.

The pupil has performed very well at both designing and making. The piece celebrates the cartoon characters the Simpsons. The design of the structure is sophisticated. The card has been folded so that it is stiff. The prop has been cut from a single side of the card. It has been deliberately shaped to spread the load. It is short and stiff and supports the card frame so that it leans slightly backwards. The use of cut outs to display the chosen images is sophisticated – circles to reveal key characters in the Simpsons. These cut outs are arranged to form the eyes in a face. The mouth cut out of the face does not contain images. The corners of the cut out are decorated with doughnuts – one of the Simpson characters favourite snacks. The level of construction skill is high in both producing the stable structure and the cut outs.

- This is the work from an able pupil.

This pupil has performed very well at designing and adequately in making. The piece is a shrine to David Beckham.

Structurally the piece started as a simple fold but cutting the upright to produce the trophy shape led to the need to provide a simple prop. This prop is deliberately minimal to avoid distracting from the trophy and is just robust enough to provide the necessary support. The overlay cut out on the cup part of the trophy matched the

shape of the cup and contains a cropped image of the footballer.



Figure 6 *The several hairstyles of David Beckham*

The side images of the footballer were added as an afterthought as a result of talking to another pupil. The simple fold technique provides the necessary stiffness. The base of the trophy holds another image of the footballer. The images have been carefully chosen not only to show the footballer in different poses but also with different hairstyles. The making is a little rushed – it lacks the precisions shown by the exceptional work above.

- This is the work of an average pupil.



Figure 7 *Structurally interesting but visually weak*

This pupil has performed only moderately at both designing and making. The piece celebrates Liverpool football team.

Structurally this is an interesting piece using fold out platforms to provide support. However, the size of the upright sheet makes the structure unstable hence the fold on the right hand edge to give some rigidity. The piece still tended to fall forwards. The pupil needed a lot of help to develop this compromise solution.

The arrangement of the overlay is not straight. The shape and arrangement of cut outs is uninspired. The lettering is weak. The level of construction is basic requiring only cutting in straight lines. Overall the piece is bland and uninspiring.

- This is the work of a less able pupil.

This pupil has performed poorly at both designing and making. The piece celebrates Bart Simpson. The pupil has drawn and coloured the image instead of using a one that was produced commercially. The copy is not particularly well done and the character isn't doing anything. The speech bubble castigating Bart does not relate well to his lack of action.



Figure 8a *Better using magazine cut outs?*

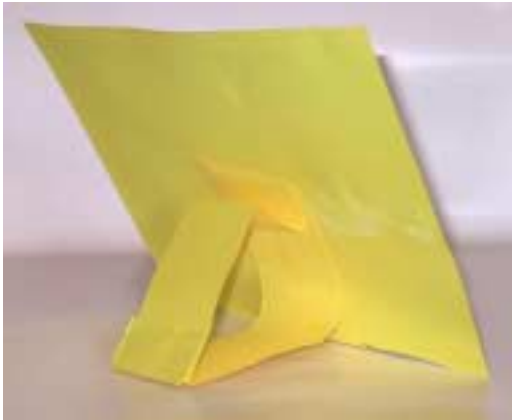


Figure 8b *A first idea that would not be modified*

The cutting out is rough and the tied prop structure only just works.

- This is the work of an aberrant pupil.

This piece celebrates Manchester United football team. The pupil completely ignored the instruction to use overlays with cut outs as a means of displaying images. He produced stability (just!) by folding the vertical edges. He put the image of David Beckham across the bottom of the frame at the end – not so much as an afterthought but to provide completion – without it the piece looks unfinished. He produced a face by means of collage selecting images from photocopies of MU memorabilia. He stuck the two footballers on either side of the face in position before he added the face.

He deliberately left the top of the face unstuck so that he could add triangular hairpieces in different arrangements. Hairstyle is an important part of a modern footballers image.



Figure 9 *Don't you just love it?*

There is a lot of deliberate designing going on here. The cutting out is careful. The arrangement of elements is highly considered. The piece has energy and is interactive. I think this is really art!

## Evaluation

Individual children valued their own work and in discussion could be persuaded to see differences between their work and that of others. Both the teacher and the classroom assistant had noted children's reluctance to move from their first idea. They decided that this was probably because they were only rarely given the chance to see a range of ideas at the development stage. This led them to suggest that in future this should become a feature of the way they taught design & technology as current practice was leading to a lack of critical thinking. They also felt that the skills used in developing the photo frames linked more naturally to those acquired during the packaging unit than to designing and making a seat. However that did not stop them moving on to this part of the combined unit.

## Introducing the seat for someone special

On the following day the teacher reminded the class that now they were going to use what they had learned in their photo frame work to design and make a model chair for someone special. To begin with, she told the class they should decide who would sit in the chair. In most cases the children chose the people they had put in their photo frames so there were to be chairs for football players, cartoon characters, film and book characters.

The teacher showed the children how to construct a basic model chair (shown in Figure 10) and how to add wings and arm rests.

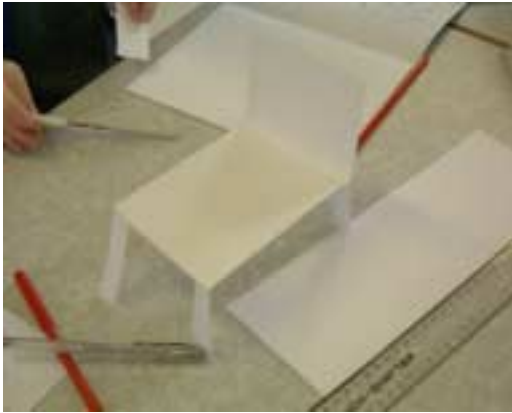


Figure 10 A basic model chair

It has to be admitted that this chair owes little in its design to the features of structures learned by making the photo frame stand up.

The children explored the development of their chairs through a mix of drawing and 3D modelling. In many cases they found that they could not model what they had drawn and both the teacher and the classroom assistant had to help the children modify their ideas. This was not always easy, as the children had developed strong attachments to their initial sketches. By lunch time each pupil

had produced a paper model of their chair for someone special. A selection of these are shown in Figures 11 – 17



Figure 11 A chair for Homer Simpson



Figure 12 Inside Homer's chair



Figure 13 A chair for Harry Potter



Figure 14 A chair with wings and a head rest



Figure 15 A chair from the film Scream 2



Figure 16 A chair for David Beckham



Figure 17 A reclining chair

#### Deciding on which one to make full size

Now the class had to decide which one to make full size. For each model chair she asked the class to decide on one good point and one bad point. She wrote the classes decisions on a large wall chart. Then she asked the class to vote on which two they would produce full size. They decided on a chair for Homer Simpson and a chair for David Beckham. These chairs were made by selected groups of pupils over the next half day.

#### The David Beckham Chair

The pupils described how he thought David Beckham would use the chair.

“After training all day David would come home, take his clothes off and put on his swimming trunks and a dressing gown.

Then he would climb up the steps to relax and sit on his chair. When he had relaxed enough he would slip off the dressing gown and slide down the slide into his swimming pool.”

During the photo frame work the pupil had learned that folding paper can be used to increase stiffness and this is revealed in the modelling of the steps. The other elements in the design are unrelated to the work on the photo frame but it is likely that the working with paper and card in the photo frame unit gave the pupil the confidence to experiment. The model of the chair is shown in Figure 16.

The completed full size chair is shown in Figure 18 below.



Figure 18 Strong enough to sit on

The group that produced the chair for David Beckham took the decision that they would not produce the steps. They knew how to make the steps by assembling them from rows of card boxes on top of one another with each higher row being shorter thus giving a series of steps but they didn't have enough card boxes. Instead they concentrated on producing a robust central column, a stiff seat with a backrest and the slide. They had the idea to make the central column from a single piece of corrugated card rolled up so that it was essentially a solid piece. The teacher intervened to explain that this would use up the entire stock of corrugated card in the school so they couldn't use this method. The compromise solution that they worked out is shown in Figure 19. They used similar rolled up tubes of corrugated card, arranged vertically, to support the slide.

The pupils had good reasons for the colours they chose. They were keen for the chair to reflect David Beckham's football team colours – hence the red. They were also keen on a royal look hence the gold slide. For decorations they added the England shield and the Addidas logo. David Beckham is captain of the England football team and appears in adverts for Addidas trainers.



Figure 19 *The internal structure of the central column*

### **The Homer Simpson chair**

This chair is derived from two suggestions. These are shown in Figures 11 and 17. The model in Figure 17 shows the influence of the photo frame work. The prop derives directly from the preliminary work in exploring stability with the elegant adaptation of different places for the prop to be held thus giving a variable recline angle. However the pupil was not clear who would sit on this chair.

The second model (shown in Figure 11) has been designed specifically for Homer

Simpson. There is a long surface for him to stretch out his legs – the pupil said that she knew he would like this as he was lazy. On the arm rests there are places for his favourite food and drink – beer and doughnuts. The box like structure does not really derive much from the work on photo frames although the arms do, to some extent, prevent the backrest from moving. It is clear that the pupil has considered the users needs in her design.

The group produced the prop for the reclining backrest by using rolled up corrugated card to form a tube (See Figure 20).



Figure 20 *A mechanism for adjustability*

They devised a hinge that could be used to join the tube to the backrest by means of a slot in the tube. When they were experimenting with different positions for the backrest they came upon the idea of Homer being able to adjust the position while he was sitting in the chair. This led to the development of a pull string attached to the bottom of the prop. By pulling on the string the prop would push the backrest to a more upright position. They provided the end of the string with a loop that could be attached to any of three dowel pegs in one of the arm rests thus locking the backrest into one of three positions.

The colours chosen by the pupils reflect the bright colours of the TV cartoon and the decoration reflects Homer's love for doughnuts. The left hand arm has a hole to take his glass of beer and the right hand arm is for doughnuts. This group were able to start with a large card box which provided a sturdy base. They used paper fasteners as the means of attaching the back and arm rests.



Figure 21 *Eat drink and relax Simpson style*

### **Evaluation**

The work of the Simpson Chair group is more innovative than that of the Beckham Chair group. This may well be because the Simpson group did not have to confront as many structural problems; the large card box they started with was sufficiently stiff and strong to meet the basic structural requirements. This gave them time to develop solutions to their adjustability requirements. The move to providing a mechanism that Homer could use was unusual for pupils of this age. Note that the pupil who produced exceptional work in the photo frame unit was in this group as was the aberrant pupil who produced the collage photo frame.