

# Playing with design and technology: experiences in the nursery\*

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Recent research with regard to design and technology has made little specific reference to activities for children aged three to five. We were interested in observing children solving a design and technology problem in nurseries with markedly contrasting patterns of organisation. We contacted nursery units, both schools and classes, within both suburban and inner city catchment areas. Whilst all based their organisation on exploratory play some concentrated on a wide experiential parameter whilst others had a highly specific design and technology focus. Some were very much involved in High/Scope methodology where children are encouraged to formulate their own learning profile through the use of identified bases, planning their own time allocation over the day. Others followed a more informal, traditional nursery curriculum.

The problem, which all groups were set, involved the design and construction of a structure to enable a vehicle to cross a gap between two chairs. The children would have some familiarity with this problem because Newcastle is a city of bridges.

To enable them to design and build the structure a variety of papers and card of different textures, colours and strengths were provided, together with adhesive, masking tape, Sellotape and scissors.

These materials were laid out on a table in the nursery and children were invited to explore the potential of the materials with regard to the set task. On some occasions a mixed group of children was chosen for us, in other cases the children just arrived through their own curiosity. In all cases the children were free to enter and leave the group whenever they wished to do so. This meant that the groups were very flexible and in only one single instance did a stable group of three remain throughout the activity. This particular group refined their own initial design continuously over a period of one hour and a half, a surprising example of co-operation since we are led to believe that children of this age range are very egocentric and remain interested for only a short time span.

Design is usually understood to involve an expression of ideas on paper, but this may be inappropriate for some children. Discussion with the children seems an important strategy in this event, since imagining in the mind is surely the initial response to a problem solving task. Ideally in a fairly open task, the discussion should be between the children, but in this case the discussion was initiated by us in some instances, however, the children talked about the task before going through the next phase of building. In one instance the children engaged in the task on an individual basis without much talk.

In all cases the children began tackling the task as individuals. In one instance, however, the group of three children, one boy and two girls, formed a discussion group to exchange design ideas but remained open to suggestions by visiting children who entered the group. Some children's contributions to the group were very short-lived while others stayed for an extended period, but the original group of three remained stable for one and a half hours experience, when this activity was then terminated by us. This stability appeared to produce a continuous flow of design ideas such

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that the original construction was continuously refined. Not only did the ideas flow but the structure became more and more sophisticated through co-operation and conversation. In another situation the children only worked as individuals, never exchanging ideas through language, merely following the design brief which had been established by one child. The task management appeared merely to reflect the teacher's original guidance, and the first design established by the children was simply copied. The management of the task was restricted so that the activity did not occupy an extended period of time.

Another group investigation produced several design briefs which were each developed and solved as one-off problems on a limited time scale. Despite our intervention, to encourage the children to look at refinement of their ideas, the children remained resistant. Analysis of video material demonstrated in this case that the girls contributed initially to the building phase of the exercise but then gradually withdrew from the group, to be replaced by boys. There was no visible pressure of any sort to exclude them. We can find no obvious reason for this behaviour but did note the boys were dominant in other construction facilities within the unit. Perhaps attention needs to be given to this situation such that a positive intervention strategy is employed to encourage and sustain the participation of girls. In one case, a girl sat on the periphery, at an art table, registering interest in the construction activities. One of us encouraged her to become more actively involved and she was able to overcome her initial reticence once she was offered the chance to explore the materials independently of the male group.

The structure of the original questions is an important indicator to an audience of intention of the communicator. It is important in design and technology to leave the question as open as possible so that the children have to think carefully about what is the task being commissioned. In spite of this, in one of the investigations where the children were asked simply to build a structure to take the toy lorry across the gap, the word 'bridge' was immediately deployed. If one had used the word 'bridge' immediately this would have restricted the thinking process without extending enabling strategies. From the children's point of view, areas where they exchanged ideas freely through talking proved to be the most productive with regard to design and execution.

The episode where three children persisted with the task for one and a half hours in a co-operative way is perhaps the most illuminating. The nursery class was organised on the High/Scope pattern. The class consisted of three to four year old children and the unit had only recently been organised on this pattern. It was particularly noticeable that the children, irrespective of gender, were very co-operative both in planning and execution of the task, freely exchanging ideas and modifying the construction by mutual agreement. They were also receptive to ideas contributed by transient members of the group. The children were quickly attracted to the most colourful papers amongst which was tissue paper, but this was quickly rejected because it was too 'bendy'. One of the boys chose blue shiny paper which was accepted by the group who then proceeded to push the lorry across the 'bridge' only to find that it collapsed. One pupil then rushed off to find an

alternative material to that provided, namely a long piece of wood which he introduced under the shiny paper. So much for one of our bright ideas. Ten minutes in and the task was apparently completed, until we asked how the lorry would get onto the bridge roadway. The child readily accepted the problem and sought more wood but it was not long enough. They then thought about this and decided that they must join pieces of wood together, which they proceeded to do with remarkable precision. They decided to use masking tape, co-operating together on the task in hand and deciding if it was neat enough. Amanda then explored ideas at an individual level, and she continued to refine the construction, adding a card tube to prevent the lorries running away as they came down the slope and a talking box and limpet shells to represent lane dividing lines. In discussion with the teacher it appeared that the talking box was the toll booth where one paid to gain access to the tollbridge. One child, Paul, returned to the group and said that the limpet strewn road would be a lumpy ride. He had not been party to planning the inclusion of limpet shells, and was unsure why they were used.

A final refinement was to scatter lentils upon the road as gravel. The activity would have continued further but to our relief, the nursery nurse took the children outside.

The children in this group did not use glue at any stage of construction but another group became obsessed with the glue provided, sticking everything together and losing sight of the initial brief. A further group explored masking tape to anchor the roadway at each end. A note of warning is appropriate here. Sellotape is wholly inappropriate for these particular tasks since its very adhesiveness leads to difficulty in handling for young children. A major surprise for us was the remarkable facility and accuracy with which the children used masking tape and scissors.

## □ Discussion

Design and technology activities afford the opportunity for children to be creative, with a defined brief, and enable them to make their own decisions to experience the properties and uses of materials and above all the social skill of co-operative learning. Co-operative learning appears to be most effective where there is a lot of talking between children. But where this does not arise spontaneously, the skill of the teacher in intervention in the activity enabling further development becomes crucial. The pattern of the organisation of the nursery may be an important variable in enabling children to become agents of their own learning.

Design and technology is an important means to allow children to explore their environment both through internalising their own ideas to solve problems and also by externalising these within a group situation.

In considering the assessment of design and technology with nursery children we need to employ a framework which continually stresses the child's own individual experiences within the task. As we have already stressed this task must be placed within an exploratory play situation. It is within this situation, by careful monitoring of the individual child, that a

■ *Continued on page 42*