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Abstract

This article describes a joint project between primary and secondary school pupils aimed at enhancing social skills as well as technological understanding and introducing children to industrial strategies such as batch production. The appraisal of this programme was undertaken through observation in both primary and secondary schools, interviews with teachers and pupils and an analysis of documentary materials.

The Council for Industry and Higher education has recently defined the long term needs of employers. In addition to flexibility and adaptability, what employers will look for in their graduate recruits will be English language competence, foreign language skills, numeracy, data appreciation, teamwork, the ability to tackle unfamiliar problems and the desire to continue to learn. (National Commission on Education, 1993: p. 302)

Context

There are increasingly strident calls being made to schools from politicians, industrialists, parents and academics to make education for children 'relevant' (Harlen, 1987). Whilst such a request is obviously both sensible and reasonable, the problem lies in its definition and the ways and means for its implementation. Relevant to what or to whom? How, within a crowded curriculum, can such an objective be achieved?

Teachers at Longbenton Community College, led by Dave Holyoak, have looked at this issue and by considering the needs of pupils, the expectations of their parents and the requirements of local industry, have come up with a solution which is both effective and enjoyable for the pupils involved.

The National Curriculum requires schools to ensure that children have a balanced education, that pupils are prepared for the world of work and within the subject of technology their education should include knowledge of 'industrial practices'. In addition there are calls made upon teachers to provide opportunities for their students to acquire generic life skills such as the ability

to work in groups, social values like caring for others and participating more fully in the life of the community.

Claims from other parties stress their own requirements. For example, research by Nicholson and Moss (1990) has indicated that companies are interested in a range of interpersonal and life skills such as the ability to perform as a member of a group as well as the need for self-discipline and self-motivation. They go on to stress that these skills go hand in hand with numeracy, oracy and literacy.

These are tall orders, the more so when it is considered that pressures such as securing examination success can very easily distract schools from all but that which can show up to their benefit in league tables. It is therefore particularly praiseworthy when a school not only includes such aims within corporate mission statements but develops and implements a plan which goes a long way to achieving them.

"To help raise the individual's understanding of their responsibilities and opportunities in the community at all levels, and to create in the individual the will and capacity to be an agent of change within the community ..."
(Longbenton Community College: 1997, p. 2)

Programmes of study directed towards industrial understanding are often subject to misunderstanding. There are those who see the role of schools as being that of preparing children to work in industry by giving them the skills and knowledge needed to fulfil industry's needs. There are others who think that industry has an unfavourable 'image' problem (particularly among more able children and their parents) and by informing children of the nature of the workplace this image can be improved. And there are those who feel that by enlightening children about the 'world of work' they will benefit through an increased understanding of a whole range of cultural, social and scientific concepts. i.e. industry becomes a resource base for education.

In the northeast of England considerable investment has taken place to change the industrial base of the region from that of heavy engineering and mining to a more diverse format. This changing face is nowhere more obvious than in the immediate catchment area of the college where the construction of a multi-million pound electronics factory in an adjacent field is well under way. It is an illustration of the changing face of industry at first hand for children growing up in this area.

Together with this change in the understanding of what 'industry' represents is the need to ensure that education/industry links are seen to be important by children, teachers and the public at large. There is an imperative to ensure that our pupils are aware of the economic base of society.

"Design and technology in primary schools should introduce children to the concept of manufacturing and the applications of manufactured products. This should include some expression of the challenge of designing and manufacturing, as well as the evaluation of common products in terms of their success in technical, aesthetic and environmental terms." (Breckon, 1997: p. 14)

This education must start with an exploration of the place of technology within the school curriculum and also its broader aims outside the confines of the National Curriculum and there is no reason why this exploration should not start with the primary school (Jamieson, 1985).

The schools

Longbenton Community College is at the centre of a large mixed community in the conurbation of North Tyneside. At its core is a comprehensive school of some 830 pupils who are aged between 11 and 19. It also helps to cater for the educational and social needs of the wider community by providing facilities, such as a library, meeting rooms and sports equipment. As well as catering for the educational pursuits and recreation of adults, local firms and a range of voluntary agencies also take advantage of this resource.

The college has a history of involvement with local business and industry. Students take part in work experience schemes and teachers have taken advantage of industrial placements to update their own understanding of current practice. The college also has a wide range of programmes with GCSE, A-level and GNVQ strongly represented. Other evidence of a strong vocational element running through the department is their participation in a Neighbourhood Engineering scheme and success in a number of technology competitions, the results of which are proudly displayed in a prominent position in the technology department.

The partners in this programme of education are nine local primary schools, most of them feeders to Longbenton Community College, and the college itself.

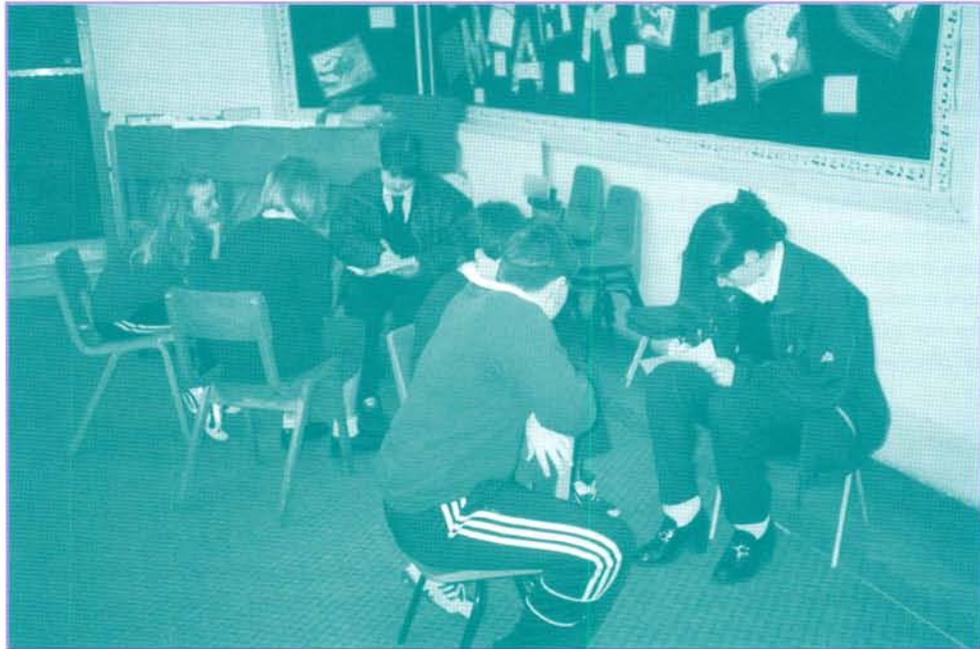
The primary school which was the focus of these observations was Ivy Road School. The school is a short distance away from the secondary school and serves a similar catchment area. The buildings of the primary school have been developed from a middle school which had changed its status when the LEA implemented a new system of primary and secondary education. One advantage this has created is the availability of a spacious workshop which is equipped to cater for the manipulation of a wide range of materials. This workshop, as well as other classrooms, had displays of work which show that 'technology' is no stranger to the school.

Aims

This programme has been developed to:

- enhance both the primary and secondary school children's knowledge and understanding of technology and industrial practice within the context of the National Curriculum
- give both secondary and primary schoolchildren an opportunity to work together purposefully in a joint venture
- give primary school children an opportunity to visit their future secondary school, aiding their induction into the larger community.

The small groups clarify details of the design specification



Implementation

How does the programme work?

The initial objective was to establish a learning experience which involved joint teaching by staff from both the secondary and primary schools together with a substantial input from the secondary school pupils. The project was to be undertaken on the premises of both schools.

In a preparatory session the class teachers from the primary school outline the task in hand to their pupils so that when children from the secondary school visit them they will be familiar with the expectations being placed upon them. The children are also well aware of what has happened in the past. The tradition of cooperation between the schools has been established over the last two or three years and the children often have friends and relatives in the other establishment who have already participated in the project.

Children from Year 9 of the secondary school then visit the primary school. After a brief introduction from a secondary school teacher the older children advise and supervise small groups of three or four primary pupils who are engaged in a design task. In this project (the projects do vary) the children were designing a 'steady hand' ball bearing game similar to the many which are commercially available. The secondary

school children led the discussion on generic design procedures as well as focusing on their specific task.

The project is supported throughout by teacher prepared work sheets which structure the pupils' work by guiding the procedure and also serve as a resource base of factual information and skill guidance. These work sheets are supplemented by a series of sheets with questions about the technology used. Such learning materials serve to consolidate the learning which has taken place and also provide a formative assessment tool to monitor the pupils' progress.

The secondary school pupils embarked upon their task by asking a series of prepared questions which elicited information about the younger children's interests and also helping to break the ice. The questions ranged from enquiries about the children's leisure activities to what they were expecting from the secondary school which they would be joining in the near future. Information about the younger children's knowledge of materials and craft practice was also obtained. (It was interesting to note that the younger children had experienced the process of 'filing' during their technology lessons; I suspect that this would have been a rare occurrence prior to the implementation of the National Curriculum.)



The production line under way

The small groups now embarked upon their 'designing' task by producing ideas for their steady hand game. These ideas were very free ranging with the older children encouraging a range of tentative solutions which they were encouraged to draw and discuss. After this session and during the following weeks the teacher of the primary school children built upon this work and enabled each child to produce a finished insert (a coloured picture of either 50mm diameter or 50 mm square) which acts as the central focus for their game.

During this intervening period the secondary pupils were engaged in the planning of a 'production line' designed to batch produce the plastic bodies of the games. This involved not only an understanding of mass production and other industrial techniques but also an insight into the properties of the materials involved and some fundamental manufacturing techniques. For example a pedestal drilling machine had been adapted to press form pre heated acrylic sheet into a specially designed jig. Another jig had been developed to enable the band saw to be used to mass produce one of the components. (Whilst the pupils 'loaded' the jig the teacher operated the band saw.)

Pupils should be taught: that materials can be classified according to their properties and behaviour, and the major classifications within the material

categories they are using, e.g. thermoplastics and thermosets. (DFE, 1995: p.7)

When the primary pupils arrived at the secondary school for the second joint session they were again divided into small groups. As before, each group worked under the supervision of the secondary pupils. This time they produced the components for the game and also assembled the finished products. (A number of components had been produced in advance to avoid bottlenecks forming.) At an appropriate time the pupils moved in groups of four or five on to the next 'station' thus ensuring involvement in the whole production process.

The primary children then departed for their own school to 'finish' the game and be involved in a 'packaging' exercise, using school produced blister packs, and an exploration of commercial issues such as the 'pricing' of the game and the need for marketing.

What advantages can be claimed for this approach? It was immediately apparent that the links between the two phases of education were not artificial or 'forced'. The relationship between the teachers of the two groups was highly professional, friendly and effective. All of the teachers were aware of the aims of the project and also their roles,

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so that as soon as the children arrived the process started immediately with no need for consultations. It was also obvious that the secondary children had all been briefed prior to the exercise so that like all well prepared programmes it looked deceptively easy, with the children taking the leading role in the manufacturing process.

- All of the children, both primary and secondary, were involved in a design and make process. The children recognised the need for a systematic approach for successful making together with strategies for such procedures. It may be said therefore that 'process' or 'problem solving' skills were not only employed but enhanced.
- Psycho-motor skills were developed in both the graphical skills needed for their 'design' work and also the craft skills in the manufacture of the game.
- Technological knowledge and concepts were evident through the manipulation of a range of materials and the employment of a number of manufacturing processes.
- Children's numeracy skills were developed throughout the project. For example they were engaged in the accurate measuring and marking out of their game inserts. This involved not only using rules and pencils but also compasses with the important control factor that their design had to fit within the manufactured case. i.e. a 'real' scenario which demanded particular care.
- The children, particularly those from the college, had to communicate effectively with their younger 'pupils'. Again this was a 'real' situation: if the younger children couldn't understand what was required they couldn't perform the task.
- Children's understanding of industrial processes was achieved through their involvement in a 'batch' production approach.
- The children were engaged in group work

How could the project be improved? The teachers are already working upon modifications to the scheme.

One of the major problems faced by schools is how to enhance children's designing skills without being over prescriptive in their approach to designing. Combined with this, is the teachers' understandable desire to obtain 'evidence' that children have been engaged in creative thought. These practices however stultify creative activity and also create an artificial understanding of the technological design process.

By concentrating more on the initial input at the 'design' stage the staff anticipate that all the children participating in the process will get a more fundamental understanding of the concepts involved. i.e. designing is a process which whilst it benefits from 'rules' or 'strategies', the really creative are those who step outside the barriers of convention to unite 'traditional' solutions with 'novel' situations.

A further development envisaged is at the 'making' stage. Whilst there is a lot of pupil involvement throughout the whole project the staff feel that they can get more 'hands on' experience for the younger children at the making stage. This may prove to be a little difficult due to the demands on resources but the staff are exploring a number of ideas and appear confident that they can resolve the issue.