A Comparison of Two English Primary Schools in Their Consideration of Progression in Design And Technology Education

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Introduction

Design and Technology has been a compulsory foundation subject in the National Curriculum for England and Wales since 1991. At that time its introduction created a high amount of anxiety amongst teachers in primary schools relating to personal subject knowledge, understanding of a complex holistic process and classroom implementation, these observations being based upon discussions made with colleagues from across the Local Education Authority in which this paper is based.

This paper contains a series of observations made in two schools where Design and Technology is seen to demonstrate 'good practice.' Each school shows elements of progression in various contexts and the following is an attempt to illustrate theory with practical examples showing how progression may operate at the 'chalk-face.'

However, schools need time to implement curriculum change and the schools contained in this study are no exception. Each has invested many hours of effort in order to produce the working environment that is seen within Design and Technology today. It is with these thoughts in mind that it is necessary to include background information relating to the processes involved during the schools' development since the initial introduction of Design and Technology as a National Curriculum subject.

Background

In response to the need mentioned in the introduction the Local Education Authority (LEA), in which the two study schools are situated, organized acomprehensive series of In Service courses, the outcome of which resulted in raising awareness, expertise and confidence of teachers in the area, and, enabling Design and Technology to become firmly established within the primary curriculum. Part of an empty school was used as a base for the courses, housing a seconded primary teacher who assumed the role of 'Advisory Teacher for Design and Technology' and an overall coordinator. The centre itself was well equipped with a full range of resources suitable for use in both the primary and secondary phases of school. It became an extremely valuable and well used resource for the LEA and one in which visiting groups were able to practice their skills, gain advice and research classroom ideas in comfortable surroundings. Additional support came from a team of teachers who worked on a part-time basis to tutor courses, each member utilising their specific area of expertise. This innovation enabled the majority to gain greater access to the subject, rather than let it remain the domain of the minority of 'specialist' or 'enthusiastic' teachers.

After this intensive period of in-service work many schools, including those in this study, began their own staff development in the subject and laid the ground rules for the future, and the response of one school to this is described later.

Subsequently however, the statutory order has undergone further revision and streamlining resulting in schools having to reassess and revise their policy and practice to some extent, taking into account changes in the status of Design and Technology as a subject in the primary curriculum, assessment procedures and implementation of the new documentation, having only recently become familiar with the 'old' layout of four 'Attainment Targets' covering the design process. (D.E.S., 1990). The current order was introduced in September 1995 and contained anumber of fundamental changes, which I believe, were generally welcomed by the teaching profession. The emphasis on the process approach, whilst still in evidence, was less obvious and reference to specific areas of concepts, skills and knowledge took a higher priority. Briefly the structure of the current order covers three main areas, those of Designing, Making and Knowledge and Understanding. Each is then further subdivided into generalised statements that inform the type of work children are to undertake and which teachers relate to their planning. Systematic assessment is seen to be an integral part of the process and both Designing and Making have hierarchical statements of attainment, termed 'level descriptions' which are used to determine an individuals progress in each area. Types of activity have been introduced to enhance capability and include 'Design and Make Assignments', where the children work through the design process, 'Focused Practical Tasks'

where the teacher identifies specific skills and techniques to extend the children's expertise, and in which there are implications for progression that will be discussed later in this paper, and activities where products are evaluated and disassembled in order to assess their suitability for given tasks. (D.f.E.E 1995) In primary schools the National curriculum covers Key Stage 1 (4–7 years) and Key Stage 2 (7–11 years).

It is against this background of rapid curriculum change that both schools have had to readdress and in some instances radically revise their approach to Design and Technology so that effective progression is catered for.

The Schools

The schools are situated in the North East of England in the towns of Middlesbrough (School A) and Stockton (School B) respectively. In addition to geographical proximity they demonstrate further similarities in terms of size, (400 approx.), catchment areas and general ethos, relying heavily on child centred experiential approaches. The schools also have nurseries attached to them and the children from here generally progress from there to the main school. The level of expertise and enthusiasm for Design and Technology generally is high in each, the basis for this being directly related to the initial LEA teacher In Service training described earlier, and the extensive periods of in school development that took place additionally.

To expand on this background further there follows a description of the intensive period of staff development School A undertook to run concurrently with the introduction of the original document. Previously, there was some evidence of classroom work but this was not organized i.e. scrap modelling, no progression in terms of skills taught and materials used and mainly down to individual enthusiasts.

The impending implementation of National Curriculum Technology was the catalyst and a Working Party was formed in discussion with the Headteacher. This comprised a Rate 'A' for Technology and other interested teachers from each school phase, including the IT co-ordinator. They were given aims of organising staff meetings and training days through the year in order to aid staff awareness and development and quell fears of including the subject in the curriculum, organising and purchasing resources, assessment and record keeping and writing a policy document. The Staff Development part of the programme was extensive and consisted of the following:

1 The Working Party were given supply cover to organise the first terms' staff meetings in detail and the rest of the year in outline.

2. September:
The staff meetings began, each led by different members of the working party.

1 What is Technology?
2 Safety and Use of tools.
3 Design Process.
4 Professional Development day – a 'fun' problem solving exercise.
5 Working Environment – display, classroom organisation and resource management.
6 Resources in school and out (including places the children could visit)
7 Visit to Design Centre (insight into KS3/4)
8 Industrial speaker
9 Visit to British Steel
10 Evaluation Session

3. January:
Monthly meetings took place to provide support and feedback. In practice this was a time when teachers exchanged ideas and experiences which helped to maintain impetus and enthusiasm.

4. April:
Meetings were held to look directly at the National Curriculum (old version, including IT), record keeping, and assessment at Key Stage 1.External assessment (SATS) were introduced. The final evaluation session was used as a Professional Development Day. Throughout the programme the working party met regularly to discuss progress, make amendments and begin writing the Policy document.

The following extracts taken from the schools' Design and Technology policy documents summarise their general philosophies after this initial staff development; 'Our underlying belief is that teaching should be about preparing children for life and in a fast changing society the skills, concepts and knowledge children develop in Design and Technology should be of the kind that will have an adaptability and transferability which will be of use whatever the technology is when they leave school. To this end our aims are:

1 To develop within the children cognitive processes, skills and concepts which will have relevance to their infant and adult lives.
2 To give the children a sense of enjoyment and pride in their ability to design and make.
3 To raise children's awareness of how technology affects their lives, and how they might effect change themselves.
4 To develop within the children the development of personal qualities such as perseverance, a willingness to lead or follow as the occasion demands, and a willingness to listen and consider the ideas of others.
5 To encourage within the children the development of communication skills both verbal and non-verbal.
6 To encourage the children to value the efforts and achievements of others.
7 To develop within the children a sense of responsibility towards tools, equipment and their working environment e.g. tidying up!
8 To ensure that wherever possible the full range of technological activity is accessible to all children regardless of gender, race ability etc.
9 To use where possible, and appropriate the local environment as stimulus for technological activity' (School A)

'Our aim is for the children to recognise the needs and opportunities for technological activity within their lives, to research and plan possible outcomes, and to realise such solutions.

Through technology children can gain a greater understanding of the world around them, learn to communicate this knowledge to others, and begin to predict and explain real life problems. As a school we see the area of technology as one which embodies the elements of Craft, Design and Technology, Art, Food studies, Business Studies and Information Technology. Where possible experiences within technology will be developed through cross-curricular themes and topics. Our whole school policy allows for progression and continuity of work, but still takes into account the need for individual investigation and for each child to work at their own particular level.' (School B)

Since that time there has been the opportunity for the schools to use the firm foundations they had created to put into place and consolidate their way of working in Design and Technology, despite having to adapt to changing external circumstances with the revision of the National Curriculum. It is from this background that the progression and continuity within the subject can be viewed at this point in time.

Progression in Practice.

As will be further illustrated, evidence of progression within the school scan be viewed from various standpoints, being related directly and indirectly to the subject area. An example of this would be an examination of progression of capability where aspects of Design and Technology are related to methods of evaluating the rest of the curriculum, such as assessment, or planning, where similar methods are used, but referring to different content.

As an overview, the National Curriculum Orders through the Programmes of Study and Level Descriptions are structured in such a way that a progression can be seen, but insufficient detail requires teachers to seek further guidance and create individual responses for their own situation. However, this assumes that children learn in a linear fashion, and, particularly in a subject such as Design and Technology where a cyclical process is involved, this would seem to be unrealistic, as if progression is seen to be advancement in successive steps, individuals will require different successive steps to make progress. This would necessitate the intervention of teachers to move children forward, building upon their existing skills and knowledge and understanding, and consolidating and revisiting more basic ideas when appropriate (Ritchie, 1995).

This issue was identified by both schools as being fundamental to being able to put their policy into practice and they felt that an assessment of the childs starting point would be needed in order to inform the teacher of the most logical way in which to proceed and how much support would be required. The implication here being that differentiation of activities may be needed and an effective means of recording individual progress so that experiences could be built upon in a structured way.

So, an efficient record – keeping system would seem to be one way of tracking progress. This is an example of how wider school issues relate indirectly to Design and Technology, each school using their whole school policy for assessment and record keeping as a basis.

Both schools have formulated different, but equally effective approaches. Assessment is seen to be both a whole school, and an ongoing, process with every teacher involved, not just those teaching end of Key Stage classes when external assessment takes place. In School B each child has a booklet containing the full set of National Curriculum level descriptions. In Design and Technology, teachers aim to observe and talk with each child half termly and record their progress by indicating which level descriptor statement they have achieved. Teachers attempt to build into their planning suitable times when such intervention is possible, as, with classes of 30+ pupils in some cases, individual attention is not easy to monitor. However, this is an example where the benefits of several years' development of

Design and Technology shows, with the teachers feeling enhanced confidence, and the children being the recipients of a consistent approach since their Early Years of schooling. This profile gradually builds up over the childs time in school. It acts as a clearly visible record of areas that may need support or extension, and substantiated by comments as to the type of evidence against which the judgements are made, is a rigorous method of allowing teachers to see where progress is /is not being, made.

In School A the system is slightly different, but equally effective for them. Here each child has a Design and Technology folder which contains evidence of their work over their years in school. Each piece, (written, pictorial or photographic) is supported by an explanation of the context in which the work took place and the specific part of the National Curriculum to which it refers. The folder is intended as a profile to show the childs achievements and in order to keep the system manageable contains one or two pieces of evidence per year. As much of the work in the early and middle years is done collaboratively the upper years of the school (years 5 and 6) include additional evidence which incorporate more formal assessment of a specific individual design and make task in which the children are given autonomy over what it is they wish to produce from within their current theme. They are encouraged to work through the design process with minimal support from the teacher. This opportunity is used to record observations against National curriculum criteria. The system was adopted before the National Curriculum revision and is an example of how a school has had to quite radically, and quickly; change their approach from one set of documents to another. With Curriculum revision being on the agenda, during an INSET day the school took the opportunity to simplify National Curriculum level descriptors into language that could be clearly understood by all members of staff, and, in their opinion make the task of matching level to individual performance easier.

Below is an example comparing the National Curriculum Level Description, Level 4, Designing, and the individual version favoured by the school.

‘When designing and making, pupils gather information independently, and use it to help generate a number of ideas. They recognise that users have views and preferences, and are beginning to take them into account. They evaluate their work as it develops, bearing in mind the purposes for which it was intended. They illustrate alternatives using sketches and models and make choices between them, showing an awareness of constraints’ (DfEE1995)

‘Pupils draw from a range of sources to help with their designing e.g. research storybooks prior to making one, use reference materials and artefacts. They have a developing awareness of constraints e.g. economy, time, materials. They suggest more than one idea and make choices considering constraints.(School A)

Teachers therefore have concrete guidelines on which to base their own observations.

Closely linked to assessment and recording is planning, with the former being used to inform the latter, and vice versa. Again, whole school policy indirectly influences progression in the subject.

Both schools have adopted a similar framework for planning their curriculum.

A three tier model of long, medium and short term planning is favoured which is centred around the topic-based approach where a central theme is used as the focus from which the individual subject content radiates. The topic themes are discussed and decided upon well in advance, during whole school planning meetings, to ensure that teachers feel part of, or own the process. Both schools use a two year rolling programme of themes to accommodate the idiosyncrasies of classes that are vertically grouped i.e. contain children of different year groups. Medium term planning occurs three times a year and involves teams of teachers who work in similar age ranges, namely, Early Years (Reception, Year 1 and 2), Middle (Years 3 and 4) and Upper (Years 5 and 6). Each teacher within the term plans for a different curriculum area and this is disseminated to the remainder of the group. Within Design and Technology categories covered during planning would include National Curriculum links, type of activity, including specific skill or material focus, teaching strategies, type of activity, resources, broad learning outcomes, assessment opportunities and cross – curricular links.

Short term planning is undertaken by the individual class teacher and puts into a manageable sequence the activities planned by the team so that they may be taught effectively in the classroom. Included in such planning would be intended learning outcomes and assessment opportunities for a specific lesson and ways in which the task may be differentiated according to the needs of the individuals in the group.

Effective and realistic planning is seen by both schools to be one of the strategies used to ensure that progression takes place and one (school A)has developed a framework that sets out to categorise a range of skills relating to different materials that they feel are applicable to their situation, covering construction, joining and combining and finishing. The same framework would not necessarily work in a different establishment as it has been produced with their topics and resources in mind. Overleaf is an example of one area covered by the framework:

Joining and Combining

Level:	1	2	3	4	5
Material					
Wood	Glue gun (Teacher)	Tri-corners Nailing (Wood) Screw Nuts & Bolts (Meccano)	Nuts & bolts (Child)	Glue gun	Mitred joint
Card and Paper	Pipe cleaner Pritt stick P.V.A	Paper clip Paper fastener Art straw Hinge	Slot and flap		
Fabrics and Yarns	Pritt stick	Begin to use needle and thread Running, blanket and cross stitch		Use needle and thread independently Button, press studs Velcro.	
Plastics	Glue gun (teacher) Sellotape	Dowelling (corriflute)		Glue gun (Child) Frame of wood for corriflute	
Food	Mixing wet and dry ingredients	Introduce correct language		Techniques i.e. beating folding	Reasons i.e. air

As the above extract illustrates, it gives teachers a broad outline of whereto start their planning knowing the type of experiences children should previously have acquired, but it is merely intended as a minimum for the types of technique the children should experience.

Issues directly related to Design and Technology, such as classroom and resource management, have, by the very nature of the systems employed be seen to demonstrate what could be termed 'built-in' progression. In order for children to become independent whilst working, great emphasis has been placed on efficient means of storing and organizing resources so that children have clear messages about what is available. The issue of resourcing has been tackled in different ways by both schools, but with the common aim of enabling children to work as autonomously as possible. For this to be achieved it is necessary for a whole school approach for resourcing to be adopted so that the children are familiar, from an early age, with what materials/ resources are available to them and how they may gain access.

Individual teachers in School A organise consumable resources that the children have free access to in various containers that enable the children to explore and manipulate them during their design and make tasks. The staff adopt a system for the storage of tools where they are placed against a silhouette background; the children knowing straightaway if one is missing. Progression is 'built in' with the

distribution of tools for resistant materials, as in the Early Years only small a selection are available which gradually increase with competence.

Some non-consumable and expensive resources are more tightly controlled and are kept in a central resource area. Staff are able to collect the items that are needed before beginning work.

The school is well equipped with construction materials and the children are encouraged to use these during their projects. Progression is again 'built in' as the kits are arranged through the school so that the children experience increasingly complex systems as they progress. For example:

Distribution of Construction Kits to Illustrate Progression of Experience.

Year Group:	N*	R*	Y 1,2*	Y 3	Y4	Y 5	Y6
Type of Kit							
Balance	Blocks --------->---------						
Push/Fix	Stickle---------->---------						
	Mobilo			Reo Click------>----			
	Duplo		Lego---------->----------->----------->----------->---------->				
				Technic (mechanical)---->----(motors)-------->--			
						Technic (control)--	
Bolt/screw			Brio-tech	Multibuild)------>----------->----------			
				Meccano)			

*(N= nursery, R=reception, Y= year group)

Construction kits are seen as an important part of the children's technological experience, and the above shows how School A is able to increase dexterity and expertise whilst maintaining interest and enthusiasm as different kits are introduced as the individual moves into a new year group.

School B operates a similar system of organisation, particularly in terms of control technology, which is an area the children look forward to using in Years 5 & 6. Work with construction is planned in with other Design and Technology activities, and children are encouraged to use parts of kits to support other aspects of their making.

In addition, School B uses a whole school approach to resources where by children use a 'traffic light' system for materials, green indicating free access, amber indicating use some, and red requiring the child to ask permission. However, the children are aware of how the system operates and of what is available to them and this encourages the independent learner from a young age. Progression is again 'built-in' as teachers only give the children access to the materials and resources they have decide dare suitable for them to use. Safety being an important issue for consideration.

The above have important effects on planning for progression and both schools recognise the importance of providing children with first hand experiences that encourage them to work in an increasingly autonomous way.

To facilitate this, both schools have designated Design and Technology areas within each classroom. These are not purpose built and it is up to the ingenuity of the individual teacher to create a suitable working environment. Such areas tend to follow certain criteria and may take the form of a corner of the classroom that gives adequate light, has an uninterrupted line of sight and has minimal potential for other children not engaged in Design and Technology activities to walk by and possibly disrupt. Quality environments are generally created so that children want to work in them, so attention is given to the 'design messages' that are displayed, e.g. children's work effectively arranged, examples of relevant literature, neat and tidy graphics and labelling, posters showing types of 'technology' and artefacts to explore, investigate and disassemble. School B and the Nursery of school A also have specialist areas for food technology, access to which is timetabled.

Introducing the children to the work they are to cover varies according to the organisation of the age range. For example, each school operates an integrated day approach in Early and Key Stage 1 classes, and so Design and Technology is undertaken as a small group, teacher intensive activity initially and with auxiliary support later. The amount of support varies according to the nature of the task.

During Key Stage 2, School A favours introducing new Design and Technology topics to the whole group, after which the children are able to complete their design work, and begin making in smaller groups as the timetable allows. The teacher intervenes as is necessary, but does not work in close contact.

School B operates in a similar mode, but there is a greater emphasis on children working independently, knowing their tasks for the day and completing them in their own time. The status given to Design and Technology in this school makes it a high priority subject in the perception of the children and they generally stay on task and work competently. The teacher is then free to offer help and support wherever necessary.

Each school has recognised the need for teaching specific skills and techniques. As previously explained, School A uses a framework of basic skills that are taught at different levels. This however, is operated flexibly so as not to stifle individual creativity, and a skill would be introduced if an individual needed the knowledge to complete a piece of work.

School B plan specific teaching points into individual topic planning, which at present works well, due to the amount of technological work being undertaken, but does have the disadvantage of being potentially hit and miss in its coverage, this being an area for future development.

The National Curriculum describes the need for Focused Practical Tasks in the revised orders and it is particularly interesting that a semi-structured approach to skills acquisition had been previously recognised by each school in order to produce enhanced capability in their pupils.

Concluding Remarks

This paper has attempted to document individualistic approaches to progression in Design and Technology. Neither school assumes to have solved all the issues comprehensively, and recognise the need for on-going development, but they do illustrate different ways in which it is possible to provide children with structured experiences during their time in primary school.

It would seem that there are common areas that require attention for the above to begin to take place, namely:

1. A supportive and enthusiastic staff who are willing to uphold whole school issues and work towards common policies.
2. A staff who view Design and Technology positively and understand the need for its inclusion in the curriculum
3. Effective assessment, recording and reporting strategies.
4. Collaborative and realistic methods of planning.
5. Efficient, easily managed and structured approaches to resource and classroom management.
6. Time, and money, to put the above into practice!

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