Issues of progression in primary design and technology

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Issues of progression in primary Design and Technology

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Hampshire LEA

Abstract
The purpose of this paper is to examine issues which need addressing if LEAs are to promote progression in primary Technology. It is strongly argued that a major problem preventing progression is a lack of understanding and agreement on what Technology is amongst teacher trainers and teachers, despite a National Curriculum Document for Technology. Primary Technology is not watered down secondary practice. The focus is on the underlying problems which prevent Technology occurring both in teacher training and in schools. The paper proposes that simply addressing progression across Attainment Targets (ATs) and Programmes of Study (PoS) without these considerations will fail to deliver progression.

The Climate

Technology has now achieved real status in the primary school curriculum. Six years ago few primary schools had heard of Technology, now we have Technology as a brand new foundation subject. This is approached with enthusiasm by many teachers but with trepidation by others. Schools and teachers are at very different stages in their understanding of National Curriculum Technology and its applications to primary practice. It will take time to implement Design and Technology and much training will be needed.

Recently there has been concern about what is meant by progression and quality as well as an increasing awareness of the need for rigour, even though implementation of Technology has hardly began!

The Problem

Already there have been a variety of interpretations of what is meant by the words 'progression', 'quality' and 'rigour'. This can be confusing to the non-specialist primary teacher who is often fearful of her own ability in Technology. The philosophy underpinning the document needs to be understood otherwise rigour, quality and progression will continue to be misinterpreted. The non-specialist primary teacher, often already lacking in confidence, will be left confused. If the philosophy is right it will be realised that primary school teachers and children often have a natural talent for Technology. Those involved in the training of primary teachers for Primary Technology need to understand the potential of primary school practice for Technology. Primary Technology is not a watered down version of secondary Technology. Prior to the National Curriculum, rigour was often associated with more about gears and levers. The content was narrow and in many cases the process was lacking. This did not deliver rigour in what we now know as Technology. Despite dissemination programmes, the heritage is still often watered down secondary practice masquerading as rigour in Technology with more subjects
added! This is a pity since the elements for Technology are already in place in the primary school but harder to implement in the secondary school. In the primary school children work in a way which is closer to the way real life designers work than in any other sector of education.

<table>
<thead>
<tr>
<th>Test Information</th>
<th>Need Design</th>
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* They often work on real life problems and events.  
* They work in an open ended way.  
* Their problems cross the whole curriculum lie Technology.  
* Teamwork is encouraged.

This is the essence of the National Curriculum Document for Technology. It is also the basis for the transferable skill for the Statements of Attainment rather than the content for assessment unlike other Foundation subjects. This process is closer to primary school practice than secondary practice. More rigour in this process will help children to attain higher levels on the Statements of Attainment.

Who should be the trainers?

It is hard to see anyone who is more able to deliver rigour in the process of Technology than the primary teacher herself! Secondary colleagues' expertise lie in the subjects which contribute to the diverse content of Technology found in the PoS. Yet we need to beware of putting watered down Home Economics (HE), Business Education (BE) or Craft, Design and Technology (CDT) as Primary Technology.

The following are required for successful teacher training in Primary Technology:

* Primary and secondary specialists will need to work closely together to discuss what Technology is and what it means to the primary school.
* Recognition must be made that Technology can be broader in primary schools than in most secondary schools.
* It must be recognised that the process of Technology is the same throughout education but with increasing rigour.
* This process is close to primary practice.
* Rigour in Primary Technology is not diluted secondary CDT, HE or BE for example. Nor is it only the sum of these and other subjects which form the core in secondary schools.
* These subjects have a contribution to make within the breadth of those already in place.
* There are very close links with primary science.
* Progression and rigour must be examined carefully.
Progression, Rigour and Quality

During the past six years the domination by secondary methodology has led to some primary schools seeing Technology as something extra rather than an approach to learning. The focus has often been on the acquisition of new practical skills and adding them to an already packed curriculum. As we have seen this approach is unlikely to deliver Technology. This has led to misconceptions of what the word rigour means. A polarisation of approaches has occurred in the primary school:

Process ------------------------------------------ Skills

This is an over simplification of the problem of what is Technology. It will involve:

- The design process
- Concepts and knowledge
- Practical skills
- Interpersonal skills and qualities
- Values

Technology is a new subject not the sum of existing subjects!

Progression in learning will not occur until primary teachers understand more clearly the structure of the National Curriculum Document itself. Sometimes schools address the PoS, as for Science, and fully believe they will meet the Attainment Targets. Primary teachers have all the documents to understand but often are not aware of the approach for unwrapping individual subjects. This relationship needs to be expressed, understood and implemented:

D+T Structure

PoS

AT4

AT5

AT3

AT2

AT1

The way to approach the PoS
The process
The transferable skill
The way designers work
The diversity of Technology
The content
To be approached through the 4 ATs

In addition more understanding is needed about how the child learns in Technology. This would enable us to find the best learning climate to nurture talent in Technology. There is little research available on developmental issues related to increasing Technological Capability. Quite different abilities and
skills are needed at different times during designing, making and testing. One skill is thinking. For example creative thinking and logical thinking are quite different, and psychological research shows they develop in different ways in the maturing child. Some children's aptitude may never be noticed. Teaching programmes need to be created with appropriate inservice so primary teachers can deliver at the right level.

Elements for progression.

The 4 Attainment Targets for Design and Technology

This is an holistic process which needs to be managed by the child. This is the measure of Technology capability. Issues of progression must be addressed for rigour in Technology. In the primary sector there is a move:

<table>
<thead>
<tr>
<th>From:</th>
<th>To:</th>
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<tbody>
<tr>
<td>Less sophisticated use of</td>
<td>More sophisticated use of</td>
</tr>
<tr>
<td>Design process</td>
<td>Design process</td>
</tr>
<tr>
<td>Needs of self</td>
<td>Needs of others</td>
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Consider where learning starts, in the nursery. Young children are able to use the design process holistically and independently through play. The play process is strikingly similar to the 4 Attainment Targets (ATs).

<table>
<thead>
<tr>
<th>Elements of Play</th>
<th>National Curriculum Targets</th>
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<tbody>
<tr>
<td>1. Explore</td>
<td>Identifying needs and opportunities</td>
</tr>
<tr>
<td>2. Discover</td>
<td>Generate a design</td>
</tr>
<tr>
<td>3. Create</td>
<td>Planning and making</td>
</tr>
<tr>
<td>4. Try it out</td>
<td>Evaluate</td>
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</tbody>
</table>

Inventing is a holistic process which is natural to children. The provision of rich play contexts which play out the Programmes of Study (PoS) can give nursery and reception children an early start in Technology. The problem for the teacher when teaching Technology is to channel children's capacity for inventing from only:

self expression of own need

to
satisfying a need which is technological and someone else's

In this setting the teacher is guided by the child and facilitates. She/he must fully understand the process, concepts, practical and interpersonal skills and values of Technology.

Sometimes teacher training has been very badly matched to the needs of nursery children and teachers. As a result teachers do not use their skills as teachers to tease out the process. Instead they teach practical skills more
suitable for much older children. As a result there is a heavy focus upon step by step teaching. The process of Technology is completely overlooked.

However, the free play approach of the nursery class would not deliver the rigour needed for level 3 in the Attainment Targets (ATs) or Programmes of Study (PoS) without skilful teacher intervention. Tasks will need to be more clearly focussed towards Technology in its varied forms.

There has been a misconception in some primary schools that simply leaving the children to discover everything for themselves will lead to Technological Capability. The process behind the 4 Attainment Targets needs to be taught as a problem solving skill which helps children to achieve results.

**GRASP ELEMENT**

**NATIONAL CURRICULUM TARGETS**

1. **What is your purpose?** Identify a need or opportunity
   Say what you are trying to achieve.
2. **Find alternatives.** Generate a Design
   Check against the purpose. Select.
3. **Take some action.** Plan and Make
4. **Review** Evaluate

This will enable the massive leap to be made by a level 5 child working on AT1. For instance consider the following Statement of Attainments (SoA):

1/5a Show judgement in the choice of sources both qualitative and quantitative in the systematic search for a need or opportunity rather than.

1/1a Describe to others what they have observed or visualized in familiar surroundings.

It is the schools' task to plan how this progression might best occur. This, of course, concerns other curriculum areas and how they might best be taught e.g. Maths.

Research is needed to determine which variables enable progression. Is it developmental with age or stage, or does experience make more difference? It is important that the children understand the purpose behind what they are doing as well as the process itself.

**Review**

**Purpose**

**Information**

**Action**

**Alternatives**

A test of this transferable skill must be whether the children can apply it to their daily lives.
If the process is not addressed, with perhaps only emphasis on the Programmes of Study (PoS), children will not develop capability in Technology. They will operate at a low level on Attainment Targets (ATs), despite perhaps reaching a high level on Programmes of Study (PoS).

**Concepts and skills, the need for rigour**

As the children design and make artefacts, systems and environments and encounter the broad range of concepts, skills, and interpersonal qualities needed for Design and Technology they will have "a real need to know". Different subject specialisms can help primary schools to adopt a more rigorous approach.

This will include the need for business and economic concepts and skills, the need for more advanced craft skills when working with materials from food to wood. Safety consciousness will also need to be developed.

Children through their designing and making need not only to be able to use and make using materials, structures, energy and control they need to be able to understand the scientific and mathematical principles behind them.

There are several important issues for primary practice. Teachers need to see these additions as extensions to what is already in place. Business and economic concepts may be taught within existing work with ease once teachers are aware of the concepts and skills. They will need, however, matching to development. Attitudes to enterprise may need to be changed as sometimes it is felt that entrepreneurial skills "are not quite right" in the primary sector. There are many craft skills already taught in primary schools. Some of these are cutting, weaving, drawing, painting, sewing, sawing and cooking. These will need to be extended rather than replaced. There is a large overlap in the Science and the Technology documents in the conceptual understanding of materials, structures and forces, mechanisms and energy.

There is also an overlap between the problem solving approach of the process of Science Attainment Target 1 and the process of Technology Attainment Targets 1 - 4. Science and Technology will need to be addressed together where these overlaps occur. It will not only make the learning in both subjects more relevant it will make less work! Neither of course will stand alone as they will be within a topic framework. A problem solving approach is a way of approaching the learning and giving cohesion to the curriculum.

Primary teachers will need to be made aware that designing and making with fabrics in a fashion context, for example, can have as much rigour as when they are helping children understand a mechanical principle when they build a working model. Often female teachers are not sufficiently aware of what they can bring to technology from everyday experience.
How children develop negotiating skills for teamwork and the ability to subdivide tasks in a team have to be addressed. We simply cannot expect children to develop these skills. Teachers must give thought to how such skills can best be learnt.

The way ahead is clearer but there is still much to think about!