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REPOSITORY RECORD

Chadwick, E.. 2019. "Continuity Between Primary and Secondary Phases in Science, Technology and Maths - an Action Research Project in Hampshire". figshare. <https://hdl.handle.net/2134/1655>.

CONTINUITY BETWEEN PRIMARY AND SECONDARY PHASES IN SCIENCE, TECHNOLOGY AND MATHS - AN ACTION RESEARCH PROJECT IN HAMPSHIRE

EILEEN CHADWICK

Advisory Teacher For Technology, Basingstoke Teachers Centre,
Kingsmill Road, Basingstoke, Hampshire.

This paper focuses upon a project designed to promote continuity of experience as children transfer from primary to secondary schools in Science, Technology and Maths in two clusters of schools. Teachers across the phases developed teaching material and teaching strategies to enable them to begin to implement a problem solving approach to learning across the curriculum.

The central aim was for the secondary schools to build upon the attitudes, skills, concepts, and knowledge developed in the primary schools. The project was taught in the Summer term of 1989 to the fourth year junior pupils so that the project could be picked up in the secondary schools in the Autumn term 1989.

The paper describes the need for the project and methods used for project development. The differing learning climates of both sectors is outlined especially with emphasis upon the teaching of Technology. The varying outcomes in the different groups is examined. Finally, it is argued that primary schools need to examine their own topic methods if they are to deliver Technology as proposed by the National Curriculum. This is, of course, at a time when secondary schools are seeking ways to integrate their own curriculum.

Teachers from pyramid clusters from two geographical locations were involved, one rural, the other a suburban commuter town. The rural area, situated in the Test Valley, contained one secondary school and seven small village schools, the smallest had two classes. The commuter town, Fleet, mainly had large junior schools which feed two secondary schools, some of the schools feed both secondaries.

Schools were chosen because of their different locations and because strong links already existed in the pyramid clusters. None, however, had attempted a curriculum link project which looked at what was taught and how it was taught. Records were transferred to secondary schools, and staff paid regular visits to the schools and staff from secondary also helped primary schools with work mainly in Science and Technology.

The timing for such a project as this was right as teachers from primary and secondary schools began perceiving the mismatch between some advanced work in Science and Technology at primary level and the experience offered on entry to the secondary school. There were, however, some wide differences between experiences offered between primary schools within each cluster. Secondary schools had difficulty in knowing where to begin their work therefore. This was reason number 1 for the project.

The excellent work of the E.S.G. Teams in introducing Science and Technology to primary schools in the past four years has ensured that many teachers have developed confidence and competence in using a problem solving approach to teach both Science and Technology. For example, children from one of the primary schools won the 1989 Young Technologist of the Year Award and were on Blue Peter.

However, some teachers needed more experience, the problem was more acute as both sets of primary schools had some very able children who had had some marvellous experiences at home in Science and Technology. We needed to train all the fourth year teachers in problem solving in Science and Technology so that they could match their children's needs.

Reason number 2 for the project was that in the early years of secondary school, Technology as a process across the curriculum was not being offered. Parents and Governors had begun to notice this as well as teachers and felt that children were being held back. Some problem solving activities within some subjects was occurring but no cross-curricular work. The proposal for Design and Technology now means that senior management will need to address themselves to this problem.

We were looking at changes in the following principles for planning the curriculum:

PRINCIPLE	FAVOURED EMPHASIS	LESS FAVOURED EMPHASIS
<u>RELEVANCE</u>	Relevant to the child's world. Links with industry (eg farming)	Remote from experience Remote from application
<u>CONTENT</u>	Emphasises skills and concepts Provides opportunities for cross-curricular links	Emphasises factual knowledge Essentially subject based
<u>TEACHING STYLE</u>	Provides a wide variety of learning experiences with emphasis upon - PROBLEM SOLVING - OPEN ENDED PROJECT WORK - DISCOVERY - CREATIVE/INVENTIVE WORK Fostering initiative and positive attitudes to new ideas	Predominantly didactic with closed problems (problems with one right answer) Fostering passive acceptance and conformity
<u>ORGANISATION AND METHOD</u>	Mainly pupil centred Featuring work in small teams Involving practical work	Mainly teacher centred Concentrating on individual effort Exclusively desk work (Reference 1)

The context for teaching Technology is right in the primary sector as children work through topics which cross the whole curriculum, often follow a problem solving approach and work independently in small teams. Secondary teachers found this context fascinating and as the project progressed it emerged that they needed to experience the primary school atmosphere by more visits. Primary teachers are especially good at embedding the science and technology in meaningful contexts which give relevance to the children's learning.

The management of the project was as follows. The time scale was 1 year and 1 term, it is still continuing at the time of writing. Stage 1 consisted of the Smallpeice organisation running a 2 day course for each of the two groups of schools. Children and teachers from the two phases worked together on cross-curricular problem solving activities. This was an excellent liaison activity as it involved the fourth year junior children visiting the secondary school for the course. Teachers were also given more experience of open-ended problem solving activities, so setting the approach to learning we wished to follow.

Stage 2

Meetings were held in the Autumn term 1988 and Spring term 1989 on project definition in more precise terms. There were different outcomes in the two groups.

The Test Valley group worked in small teams to devise a project they would all teach in the primary school in Summer term 1989 and Autumn term 1989. Teachers from primary and secondary teachers from Science, H.E., C.D.T. and Maths were involved. The chosen project was food because 1989 is Food and Farming Year.

There were three groups. Nutrition, Farming, Packaging and Marketing.

The Nutrition project was Design and Make a Picnic which is a balanced mid-day meal. Children were encouraged to use investigative methods from science, maths especially and to use a variety of ways to find out information.

The Farming project started with a Farm Visit a posing key questions such as finding out about purpose of farm, people's jobs, crops, farming methods, building and equipment.

The Packaging and Marketing project started with a problem. To grow, package and market a quick growing fresh food such as cress or mushrooms.

Stage 3

The teaching of the project in the primary schools. Secondary teachers visited the primary schools, helped with the teaching of the project and hosted an exhibition of the work which the C.E.O. attended. The secondary teachers from Science, Maths, H.E., C.D.T. and Humanities all then worked together to produce their own booklet of their project to be taught in Autumn 1989.

The outcomes in Fleet were different. The C.D.T. and Science departments had previously played key roles in working with the schools and the project outcomes in secondary were more confined to these two departments. The primary schools also wished to undertake their already planned projects which were various - Castles, The Community, France, for example.

Unfortunately, in order to gain agreement a very narrow design brief was agreed upon which all schools had to fit within their topics. As the group had 'owned' the project from the beginning it was not possible to change their thinking. This was rather sad as some excellent broad-based work had occurred in the primary schools previously but some of the secondary departments in the group were very traditional. It is the influence of these which restricted the design problem and therefore the creativity of both teachers and children.

Bridges have been built, however, and primary pupils are due to make presentations of their work in the secondary schools in early Autumn. Science, C.D.T., and Maths departments are currently looking at how they might build upon the experience. Teachers are also visiting the primary schools with something specific to look for and most importantly they are seeking a way together.

Primary schools also within Hampshire are beginning to look at what they mean by Topic based work and whether this work is really integrated. At the best it is a superb vehicle for all the National Curriculum subjects to date. At its worst it is no better than an umbrella for single subjects and this cannot deliver technology.

The continuing projects have certainly raised questions and left us still seeking answers.

REFERENCES

- 1) The Fulmer/Berkshire Project - Towards More Relevant Education
- 2) Problem Solving:- Science and Technology in Primary Schools-
The Engineering Council