Report of the Cross Disciplinary Approaches Workshop

21st September 2010, Bayreuth

Tina Jarvis and Janet Ainley from the University of Leicester, UK made a presentation which focused on experiences of cross disciplinary approaches through the Pollen Project and early work exploring links between science and mathematics and inquiry in Leicester. This provided the opportunity to consider the rationale for adoption of cross disciplinary approaches and to identify some of the issues to be addressed in planning and the implementation in schools. Throughout the session there were opportunities for discussion between all participants.

As the focus of the Fibonacci project is inquiry some discussion was held about the meaning of the term 'inquiry' which identified variation in use between different situations and difficulties experienced as a result of the differences of interpretation and difficulties in translation into particular languages .

The cross disciplinary approaches discussed were wide ranging and included links between science and language, literacy, history, geography, drama, art, ICT, mathematics . The complexities of each of these links vary between different phases (pre -school, primary and secondary) and within each setting as a result of particular curriculum organisation and requirements.

Cross disciplinary approaches enable the teaching of children in a holistic way that is less disjointed and in a context that is meaningful and more memorable to them to them. Children can appreciate these contexts and so are more able to apply learning to their lives. The children are enabled to use similar skills in different subjects helping them to understand and use these skills more widely. A particular advantage is that the language of the context is the same in each subject, making it easier for pupils who speak English as a second language to understand skills and concepts being covered**.**

When developing cross disciplinary approaches decisions need to be made about: whether one topic should be dominant; how many subjects can be covered in one topic; and how a lack of balance can be avoided. The importance of achieving both quality and real links was stressed. Linking only two subjects, with information technology used alongside if appropriate, was found to be sensible.
Different approaches were discussed including use of science as context for development of skills in another (for example using a science context for development of literacy skills) and use of science skills and knowledge in other subjects such as history or geography.

In the Pollen project initial links were made between mathematics and science involving data handling and shape but further work was required as the links were fairly superficial. Key issues appeared to be that: both subjects require careful progression of concepts; the emphasis on manipulating numbers, rather than exploring the development of mathematical ideas as part of a science activity is limited; and teachers and tutors have had little experience of developing both subjects together.

The rationale for linking science and mathematics presented included: the important role of Mathematical ideas play in the explanatory power of models in science; 'School mathematics' often lacks purpose: scientific inquiry is a rich source of opportunities to use mathematical ideas purposefully and understand their utility; data handling in primary schools is often based on artificial contexts. In scientific inquiry decisions have to be made about collecting, displaying and interpreting real, messy data and this provides rich opportunities for learning statistical ideas in meaningful ways.

The current approach to the development of cross disciplinary approaches in science and mathematics has involved science educators presenting a sequence of science activities for progression a topic (e.g. Insulation and heat loss or dissolving) and for the mathematics educator to look for opportunities for mathematical ideas, and then consider appropriate progression. 'Big ideas' such as ratio and proportion have become apparent and future developments will focus on the clarification of the big ideas in both science and mathematics. Opportunities for sequential development of learning in both subjects will be identified.

The following issues relating to cross disciplinary approaches were identified

- Ensuring progression and continuity of skills and knowledge in all subjects and monitoring progress in each
- The need for change to organisational practice / timetabling in schools
- Teachers' lack of experience of teachers in using a new pedagogy. Some are not enthusiastic. Others lack confidence with subject knowledge and need professional development.
- Lack of resources (funding, equipment & time) can be limiting. 'Rethinking' and rewriting plans takes time.
- Appropriate support for teachers will be required

Overview slide presented to plenary meeting

- The meaning of 'inquiry' varies from situation to situation and has been difficult to translate from some languages
- Cross disciplinary approaches involve varied links ranging those between science and language to those between science and mathematics. The complexities of each of these vary between different phases and different settings
- The value of cross disciplinary approaches are accepted if gains for each discipline are clarified
- It is important to identify the needs of teachers and to provide appropriate support and a programme for development