

Cross curriculum cooperation in product design

Hinchingbrooke School, Cambridgeshire
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Pupils often seem uncomfortable when confronted with a science teacher talking about mathematics in a science lesson or a design and technology teacher talking about science in a design and technology lesson. Karen Laws, a secondary science teacher at Hinchingbrooke School who had trained as a primary teacher, had observed that pupils viewed lessons as isolated and stand alone with respect to curriculum areas. When the opportunity to research these observations became available, she was inspired to try and find out more about making links and if this could support pupils in their studies.

Aims of the study

The aims of this study were to:

- create a learning environment where pupils use knowledge, understanding and skills cross curricula;
- help pupils understand that learning is not a series of discreet lessons but rather a continuous journey;
- provide pupils with an understanding of the real world and real life situations;
- develop a base of expert teachers that can promote learning cross curricula;
- develop individual teacher's skills to teach outside their specialism.

Teachers involved

Karen Laws (Team leader) – Teacher of science (Physics specialism)
Richard (Dick) Dunkley – Head of design and technology
Mike Hancock – Teacher of mathematics

The project

The project revolved around a curriculum design and technology project to use sheet aluminium to design and construct a camping stove based on a truncated pyramid. The science and mathematics teachers developed investigations to complement this. The focus groups were Year 8 lower middle ability (science) sets.

In science, two investigations relating to material choice for a specific purpose were undertaken. In mathematics, two lessons were taught relating to nets and surface area. The vocabulary used in design and technology was also used in the science and mathematics investigations.

Outcomes

When a link to design and technology was made in science pupils engaged with work in a more inquisitive way. The pupils were thinking about the outcome and what the focus question was. There were more questions and observations generally in the classroom and a sense that when the pupils had made their selection of the most suitable material they could draw their own assessment about the validity of their conclusion.

Karen Laws: *"Pupils learn so much more when there is a reason to learn."*

In design and technology there were two significant outcomes. Students found it far easier to produce a specification for their camping stove having had prior knowledge from their science lesson. They were also able to discuss the properties of aluminium, to the expected level of a GCSE group, as a result of having worked with the material in their science investigation. Overall there was a confident application of scientific knowledge within the design and technology lesson and less hostility to the teaching of scientific knowledge in the lessons. The quality of the finished project was consistently and significantly higher than in previous years for this project and across all ability ranges.

Dick Dunkley: *"It has allowed pupils to join all the dots."*

In mathematics there was strong engagement and enthusiasm and ownership of the lessons was very evident. Pupils were focused and addressed the questions confidently and enthusiastically, developing ideas about material requirements and wastage. They linked in the different views to promote the overall product design. Overall the lessons were easier to manage, less pressure for teacher and pupils and ultimately the lesson was more enjoyable for all producing more confident students.

Mike Hancock: *"Learning is not a sequence of separate lessons but a journey involving different stages."*



Impact on the teachers

Karen says:

"As expected from my primary school days linking topics and giving pupils concrete reasons for completing tasks improves the quality of the work and the outcome. The children feel more successful and confident having newly discovered knowledge that they own and can take to a different lesson. Generally the pupils agreed that they felt the second investigation was better because they knew why they were doing it."

"At Hinchingsbrooke School we are currently reworking our KS3 schemes of work based on a thematic approach and linking lessons to concrete ideas and specific tasks to an end product. For example in the magnetism and electricity topic the pupils create magic tricks using magnets and build and light a model stage to perform their magic trick. The standard of work has been significantly higher than in previous years when children are asked to complete worksheets and make circuits following the teacher's directions."

Mike says:

"I have seen a big improvement and enjoyment in lessons now that I link maths into the real world, e.g. when considering measuring/calculating area or perimeter of a football pitch. I found it a focused opportunity to try something new and take risks without feeling any pressure if the proposed teaching method wasn't successful as this was a research project. I was more relaxed and found the lesson more enjoyable for both himself and the pupils, providing a more engaging learning environment."

Dick says:

"I have been reassured that this process has supported my belief that the three subjects are inexorably linked. I have been delighted that this has been confirmed with learners of this age."

Advice for other teachers

It is vital that teachers at the coal face commit to tackling these type of research projects. They are vital to the way we develop as teachers and how we can develop the curriculum to benefit our students.

Things to think of:

- don't try and take on too much;
- keep the question simple;
- pupils don't always follow your plan so be prepared to be flexible;
- remember what else is happening in your teaching (research takes time);
- tell everybody what you are doing and ask for help.