Topic: Science Fair Ideas

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Issues tackled:

1. **Investigative skills - Predicting, planning, questioning, and obtaining evidence.**
2. **Investigative skills - Analysis and evaluation.**
3. **Applications, relevance and cross-curricular issues – Designing investigations.**

Issue 1: Investigative Skills - Predicting, planning, questioning and obtaining evidence

Trainees have already covered on their PGCE course:

Tasks for trainees:

Preparation for tutorial:

1. Both trainees together think about the best material / design for an egg cosy. Trainee 1 - Design an experiment that would allow pupils to gain access to the higher levels in skills P and O and be prepared to explain why this would be the case.
2. Trainee 2 - Be prepared to explain why it will allow pupils to access level 6 and 7.

Possible activities during tutorial:

1 and 2. Describe their design and explain why it would allow them to gain level 6 or 7 in skill P and O (planning and obtaining).

Mentor Input:

- Try to tease out the differences between a level 4, 5, 6 and 7 plan. What makes a level 6 or 7 piece of work?
- Bring out the idea that it's the scientific knowledge base that determines the level once you get to level 5. Do the pupils have enough of a scientific model in order to write a prediction showing higher level knowledge? Is the data that they plan to collect appropriate? Can they do any preliminary work? If yes what could it be?
- Ensure they understand the terms dependent and independent variable and also continuous variables and how they link to the NC levels.

Reading:

Subject knowledge and understanding

Any GCSE text book. Read about conduction, convection and radiation.

Subject pedagogy

DfES Key Stage 3 Strategy: http://www.standards.dfes.gov.uk/keystage3/
Click on 'resources and publications', scroll down to 'Science', click on 'scientific enquiry'.
Sang, D & Wood-Robinson, V. (2003) **Teaching Secondary Scientific Enquiry**, ASE, Hatfield.

Useful websites and applications

http://www.sci-journal.org/index.php?link=teachers.php

http://www.sci-journal.org/index.php?link=help.php&template_type=tips

Resources:

Issue 2: Investigations - Analysis and evaluation

Trainees have already covered on their PGCE course:

Tasks for trainees:

Preparation for tutorial:
1. Look at the results from a year 9 or 10 investigation where pupils have plotted a graph of the results and written a conclusion and an evaluation. Mark this work.
2. Level their work using the National Curriculum document or if you wish the GCSE descriptors (mentor to decide).

Possible activities during tutorial:
1. Trainees to mark each other's work and discuss any differences.

1 and 2. Trainee to explain their marking and justify the level they have awarded.

Mentor Input:

- Bring out key points such as:
  - Ensure trainees point out the basic relationship before launching into theory.
  - The differences between accuracy and reliability.
  - The common misconception that pupils have that repeating results makes the experiment fair.
  - When can data be ignored?
- Discuss 'best fit' curves / lines.

Reading:

Subject knowledge and understanding

DfES Key Stage 3 Strategy: http://www.standards.dfes.gov.uk/keystage3/
Click on 'resources and publications', scroll down to 'Science', click on 'scientific enquiry'.

Subject pedagogy

KS3 Strategy materials covering Sc1.
Sang, D. and Wood-Robinson, V. (eds) (2003) **Teaching Secondary Scientific Enquiry**. John Murray, London. Chapters 4 and 5 are especially relevant.

Useful websites and applications

Resources:

Task 1
Pupil data

Tasks 1 and **2**
National Curriculum document or GCSE coursework guidelines.

Issue 3: Applications, relevance and cross-curricular issues- Designing investigations

Trainees have already covered on their PGCE course:

Tasks for trainees:

Preparation for tutorial:
1. Bring an invention idea.
2. Design a guide sheet to help pupils develop their design.

Possible activities during tutorial:
1 and 2. Present their ideas and explain how their sheet could support pupils in the design and process and reinforce scientific ideas.

Mentor Input:

- Discuss their ideas and how they link into physical science. What physical science concept does it link into? E.g. materials, forces, electricity etc. and how could they reinforce this with the pupil inventor.
- What other subject links are there? ICT? D&T? Geography? And what do these other subjects do that you could 'tap' into? E.g. the evaluation process from D&T, costings from Maths, writing for an audience to advertise the product / design etc..
- A discussion about timings for the finished project.
- Look at the D&T National Curriculum and think about how it links with physical science.

Reading:

Subject knowledge and understanding

Look at the Design & Technology National Curriculum.
http://www.nc.uk.net/webdav/servlet/XRM?Page/@id=6016
Click on 'Design and Technology'.

Subject pedagogy

Useful websites and applications

www.nc.uk.net

Resources:

Task 1
Design & Technology National Curriculum.
http://www.nc.uk.net/webdav/servlet/XRM?Page/@id=6016
Click on 'Design and Technology'.