Topic: Electromagnetic Effects

Issues tackled:

1. **Key ideas, use of language and terminology - Using key words in simple and correct terms. *Fleming's right and left hand rules.***
2. **Model and analogies - A model to describe the use of transformers in the national grid.**
3. **Applications, relevance and cross-curricular issues - Uses of electromagnets and transformers.**

Issue 1: Key ideas, use of language and terminology - Using key words in simple and correct terms. *Fleming's right and left hand rules.*

Trainees have already covered on their PGCE course:

Tasks for trainees:

Preparation for tutorial:

1. Use the scheme of work and specification to identify the key words in this topic. (E.g. Voltage, current, generator). Find simple definitions for each word and then prepare a glossary which can be given to the pupils.
2. Use scheme of work and specification to identify the key words in the topic. (E.g. Voltage, current, generator). Find simple definitions for each word and then prepare a card sort game or card loop game which can be used as a starter or plenary.

Possible activities during tutorial:

1. Present a way of introducing the use of a glossary to pupils.
2. Demonstrate and evaluate the card game.

Mentor Input:

- Discuss the use of language and any misuse of key words during the tutorial.
- Discuss where in the lesson the key words will be introduced,
- Discuss activities to assist the learning of key words and the type of learner they would be suitable for, also the level of pupils they are aimed at.
- Introduce Fleming's left hand rule and show a simple demonstration to show it. Discuss the difficulties pupils experience with it.
- Introduce Flemings right hand rule and discuss the situations in which it should be taught and applied.

Reading:

Subject knowledge and understanding

KS4 or A level text books on electromagnetism.

Johnson, K. and Ryan, L. (2004) **Physics for You**, Nelson Thornes, Cheltenham.

Subject pedagogy

Useful websites and applications

http://www.science2learn.co.uk Follow links to **KS4 physics** and **magnets and electromagnets.**

http://science.howstuffworks.com/electromagnet4.htm animations and slides identifying some keywords.

Resources:

Task 1 and **2**
Specification

Scheme of work

Tutorial
Equipment to demonstrate Fleming's left (and right) hand rules. For example Large horse-shoe magnet, 3 copper rods, sandpaper to clean, power pack and connecting wires, model dynamo, ammeter.

Issue 2: Models and analogies - A model to describe the use of transformers in the national grid

Trainees have already covered on their PGCE course:

Tasks for trainees:

Preparation for tutorial:

1. Use school resources to make a model of the national grid to show the importance of the step-up and step-down transformers. Check with a teacher/technician and the CLEAPSS manual before setting up any practical equipment.
2. Research the national grid. Plan an explanation to include the location of transformers and the reason for stepping up the voltage.

Possible activities during tutorial:

1. Demonstrate the model and use it to support an introduction to transformers in the national grid.
2. Deliver an explanation of the national grid as if to the class. Answer questions.

Mentor Input:

- Act as a pupil and ask challenging questions.
- Answer any questions arising from the demonstration.
- Discuss the safety issues of using step up transformers.
- Discuss how to maximise learning outcomes from this activity.
- Introduce quantitative relationships between power, voltage and current.
- Discus the use of AC and not DC in the model.

Reading:

Subject knowledge and understanding

Avison, J. (1984), **The world of physics**, Nelson, Surrey.
Johnston, B. (1986), **Physics for GCSE**, Heinemann, London.

Subject pedagogy

CLEAPSS manual– Mainly Physics (mains electric) page 1235
Duncan, T. (1977), **Physics for today and tomorrow**, Butler and Tanner, London.

Useful websites and applications

http://www.eng.uct.ac.za/~victor/electric/grid.htm

Resources:

Task 1 and **tutorial**
Materials to set up a national grid model.

Issue 3: Applications, relevance and cross-curricular issues - Uses of electromagnets and transformers

Trainees have already covered on their PGCE course:

Tasks for trainees:

Preparation for tutorial:

1. Prepare a Power Point presentation on the variety of uses of transformers (to suit school specifications).
2. Prepare a worksheet or activity (such as a research activity) on the variety of uses of transformers (to suit school specifications).

Possible activities during tutorial:

1. Present presentation.
2. Evaluate worksheet or present activity.

Mentor Input:

- Act as pupils to ask challenging questions.
- Discuss pros and cons of activity versus worksheet.
- Discuss the validity/benefits of PowerPoint presentations done by teacher and by the pupils and uses of this technique. Use of ICT as a motivator.
- Introduce other uses of transformers (if any obvious uses are missed).

Reading:

Subject knowledge and understanding

Most GCSE test books.

Subject pedagogy

Useful websites and applications

http://sound.westhost.com/xfmr.htm

Resources:

Task 1

Computer running PowerPoint and projector.