Overview

09 December 2019 09:16

Name: ANDREW HARRIS

Student number: 1903471

Pathway: Secondary

Targets from previous assignment:

	Target	What I have done in this assignment...
Target 1	Look at how you can improve the cohesion by making explicit links between sections.	I have tried to improve the linkages across the essay although the nature of this assignment is that it is split into the three pedagogical principles
Target 2	Make sure that do not use such short paragraphs. Forming more robust paragraphs will help you improve the overall authority of your writing.	I have worked on this and I think that the paragraphs and arguments are better for this assignment.

Link to OneNote:
https://uowtsd-my.sharepoint.com/:o:/g/personal/1903471_student_uwtsd_ac_uk/ErcPd8ozJ7tLpT8HJmuNBS0B5mCvIGEl6761XodXtIQ7HQ?e=jGA6s8

Assessment for Learning Principles

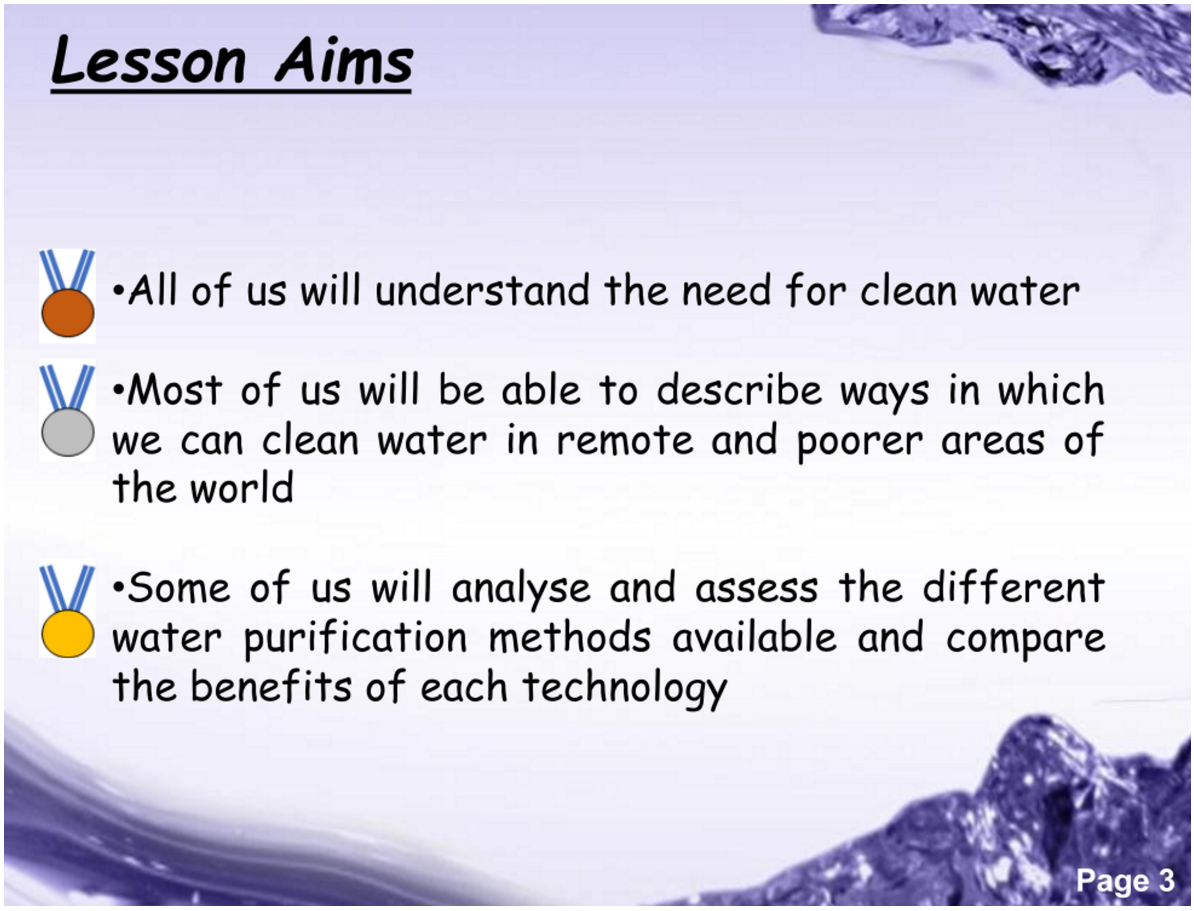
31 December 2019 17:04

Good teaching and learning means employing assessment for learning principles.

General - Throughout - All year groups

Sharing the Learning Objectives

In the majority of lessons where I have led the teaching I have included a slide in the early part of the lesson to demonstrate to the class the lesson Learning Objective. This is usually broken down into "all of us / most of us / some of us" in terms of what the learners will achieve by the end of the lesson. Some illustrative examples are provided here:



Year 7 Lesson Objectives

Lesson Objectives (for next 3 lessons)

- All of us will understand that different metals will react differently depending on their place on the reactivity series
- Most of us will be able to describe how reactivity changes across the reactivity series.
- Some of us will be able to predict how metals will react during displacement reactions.

Year 8 Lesson Objectives

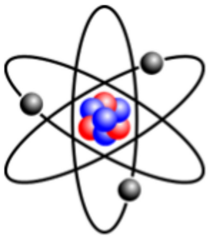
Learning Objective

- All of us will understand the constituents of blood and where is it made in the body
- Most of us will be able to describe how a forensics crime scene team can confirm the presence of blood
- Some of us will be able to test blood samples and evaluate the results to determine blood groups and confirm / discount suspects.

Year 9 Lesson Objectives

Learning Objectives

10DSC - Electronic Structure



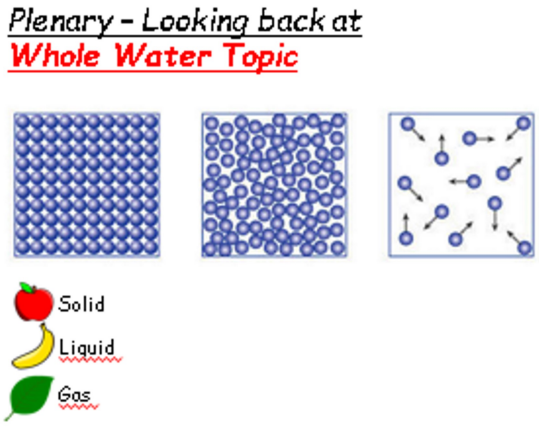
- All of us will understand the basic electronic structure
- Most of us will be able to calculate how the electrons in atoms are arranged in energy shells
- Some of us will be use this information to identify elements by analysing electronic structure diagrams

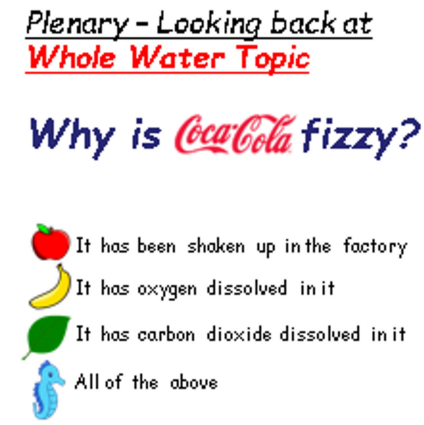
Year 10 Lesson Objectives

7th November 2019 - Year 7 (7NS)

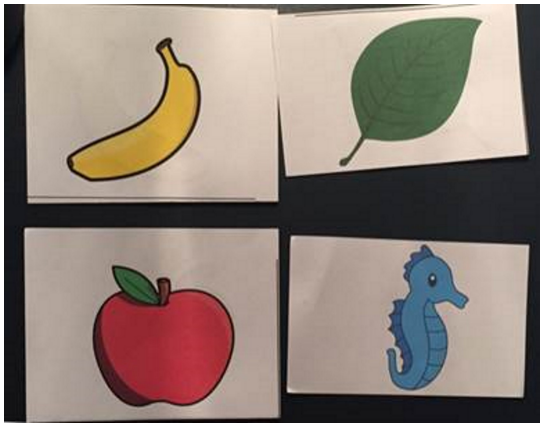
Use of Quiz Cards during Extended Plenary

In a Year 7 lesson during an extended plenary at the end of the lesson I used quiz picture cards to assess the learning for the whole topic covered in the first half term. The results from this exercise has informed the focus of a revision lesson planned for next week before the learners undertake an end of topic test. Whilst this approach did identify one particular area where the majority of learners were struggling (separation techniques) it also showed that different learners struggled in different areas, so the revision lesson will be split into two, with the first 15 minutes focussed on separation techniques and the rest of the lesson allowing the learners to focus in on the areas where they struggled during the quiz.





Examples of two of the plenary quiz slides.



Example of the red/yellow/green/blue answer cards

Completing this type of quiz at the end of a lesson allowed me to quickly confirm whether the class had understood the key points of the lesson. This is useful information and helps me assess what the best approach will be in future lessons depending on the classes understanding. The potential pitfalls of this approach are:

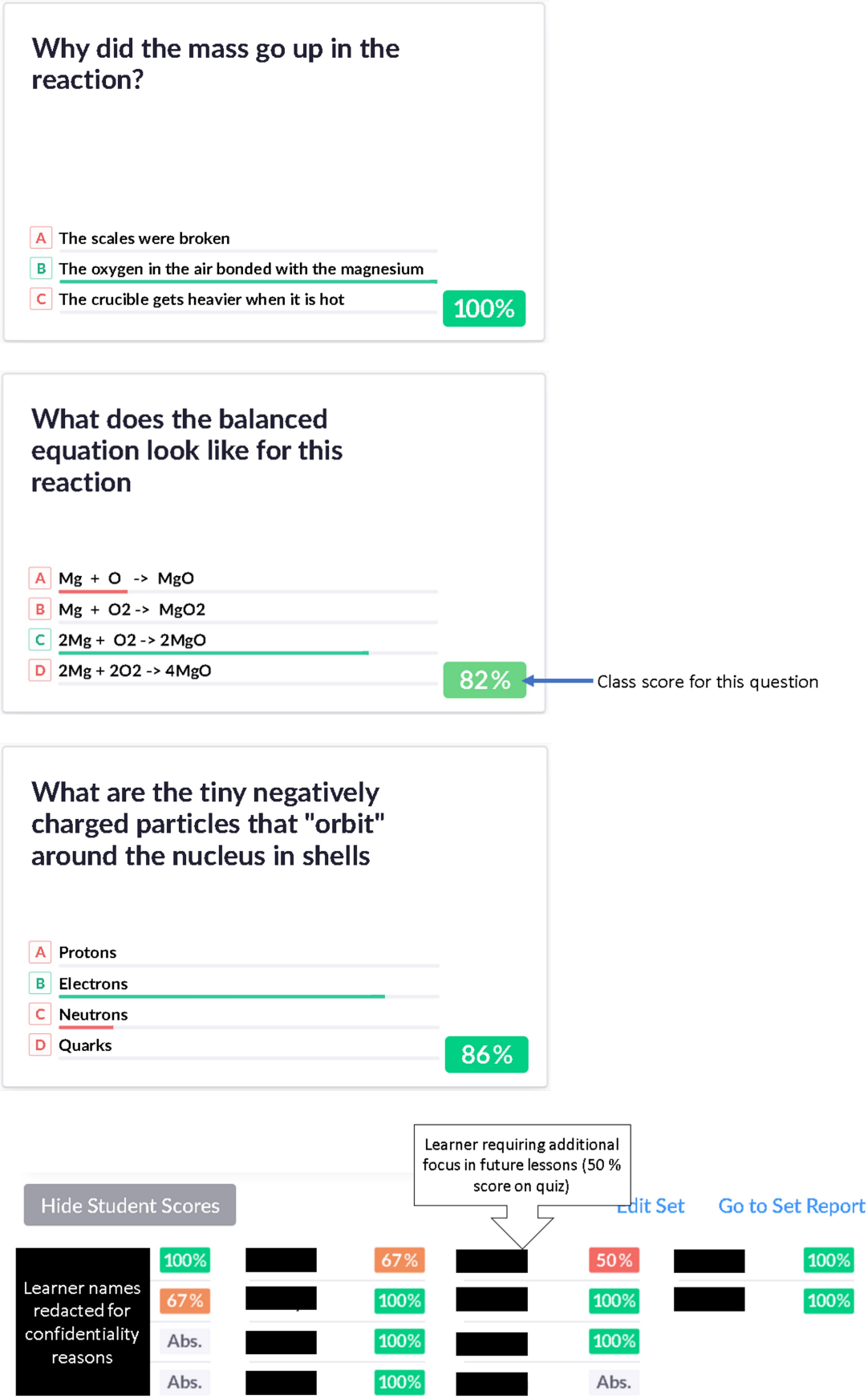
- Learners who are unsure or not confident can choose to simply copy the majority of their peers if they don't agree with the answer
- It can be difficult to gauge exactly what proportion of the class got the answer correct and the performance of individual learners

4th December 2019 - Year 10 (10DS3)

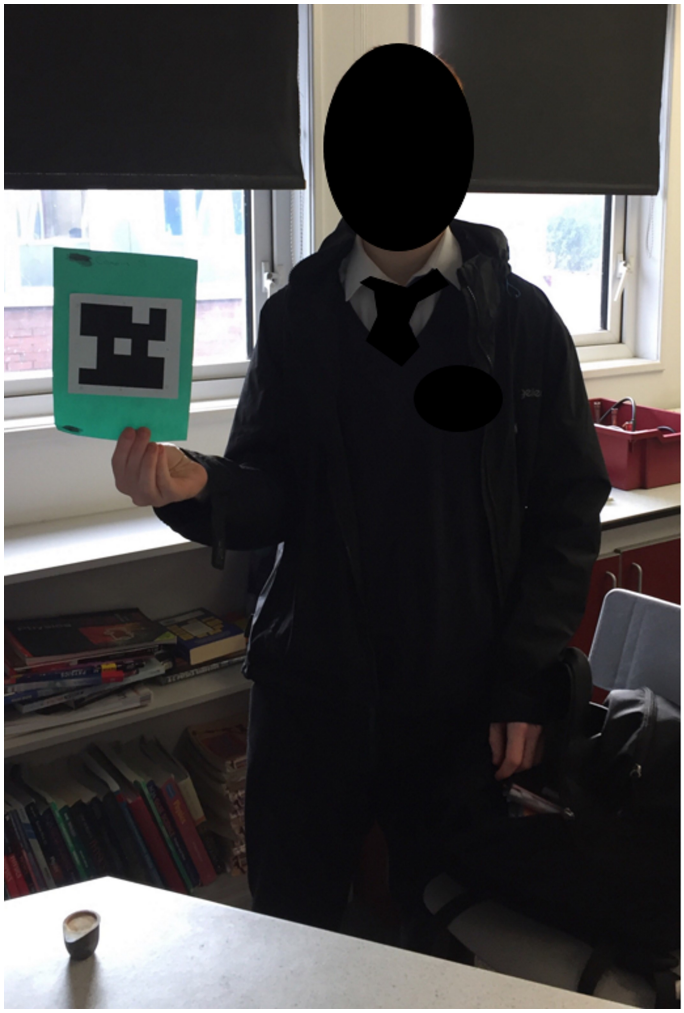
Use of Plickers

At the end of a lesson where the class had completed a science practical experiment (conservation of mass in the oxidation of magnesium), I used Plickers to test the learners understanding of what had happened during the practical and why they obtained the results that they did. In addition, one question referred back to work that the learners completed about 3 weeks ago regarding the structure of an electron. As can be seen in the output from the Plickers quiz the majority of the class answered the questions correctly. It also identified a couple of learners that I need to spend some more time with in future lessons.

Plickers is an interactive tool that using printable "paper clickers" as shown below. The paper clickers are unique to the learner in that class and can be orientated to answer either A, B, C or D. Answers are collected rapidly by scanning the class using the Plickers app on a mobile phone.



Use of Plickers with 10DS3 - with individual question results and individual learner results.



Learner holding his individual Plickers answer card during the Plenary quiz.

By using Plickers in a class plenary at the end of the lesson it allowed me to quickly confirm whether the class had understood the key points of the lesson. Whilst this can be done by using other, more simple methods (e.g. hands up for different answers), Plickers has some additional benefits:

- Learners cannot tell what answer their peers are voting for. Each Plickers card is unique and the A, B, C & D signs are very faint so not visible from distance. This forces the learners to answer from their own knowledge rather than going with the majority of their peers.
- Plickers automatically records which learners got which answer correct and incorrect. This allows me to review the learners performance following the lesson and keep track of individual learners performance. For some classes I have repeated the same quiz a couple of weeks after the initial quiz to see whether learners now understand the concept. Or if they have now forgotten it!

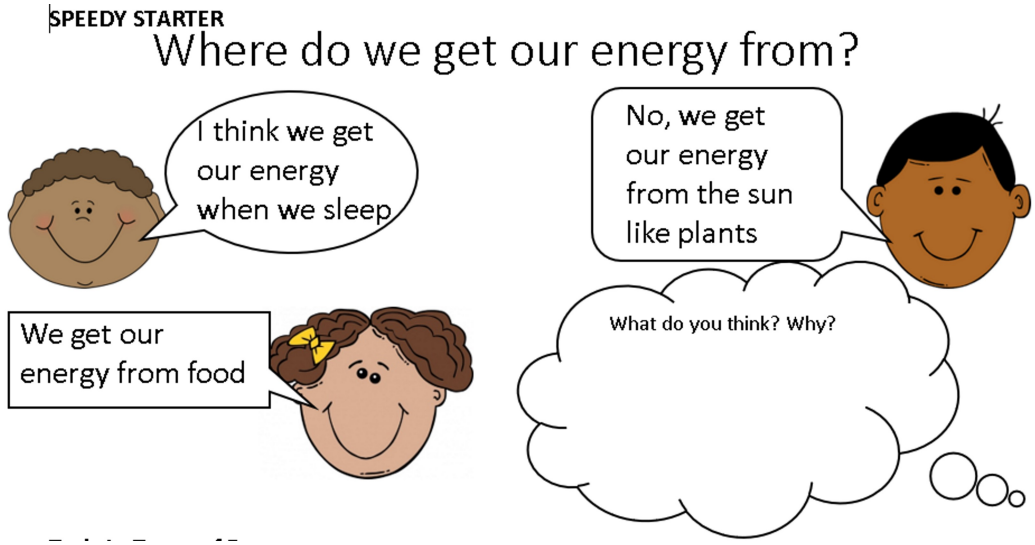
20 November - 7NS

Use of concept cartoons

This lesson was focussed on introducing the nine types of energy to this year 7 class.

By using a concept cartoon in the starter section learners were encouraged to engage in the task. By providing options that other "people" had suggested the fear of failure is greatly reduced for less confident learners and they are more likely to have a go at putting an answer in the cloud. For more able and talented learners there is an opportunity to agree / disagree with the statement but also to add some

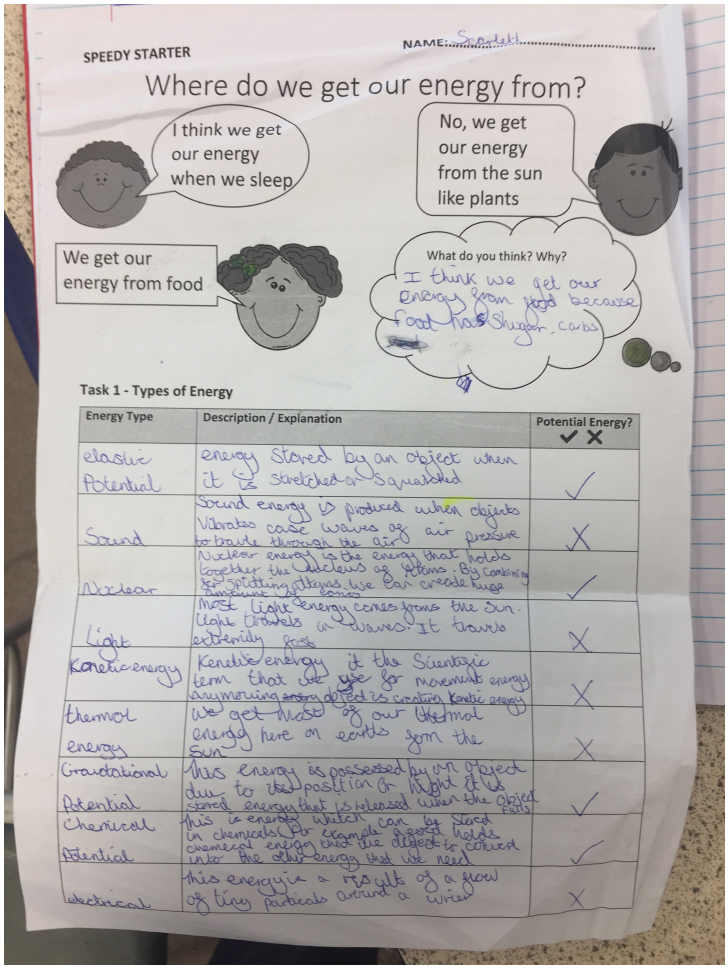
additional information that they may already know. The possible answers provided to learners included some options that match up with common misconceptions in this topic area. This subsequently allowed us to discuss these misconceptions and explain why they were not correct.



First part of worksheet for starter activity

Time	Activities/Methodology/Key Concepts (Teacher's Role – including key teaching points, differentiation strategies and key questions)	Pupil Tasks (Pupils' role –including differentiation, engagement in formative assessment and homework)	Resources (Including Health and Safety requirement)
Opening phase (with links to prior learning) **15 minutes**	Give learners the worksheet as they enter the lesson and advise them to get into their seats and start the DO NOW task. Remind them not to attempts anything apart from the DO NOW task. When everyone in class briefly talk through requirements on DO NOW slide and ensure that all learners understand the task. Take the register whilst learners completing the DO NOW starter task.	Complete the DO NOW task	PowerPoint and worksheets
	With "pens down and eyes on me" talk through the DO NOW answers: • First ask for a show of hands to see which options the learners have chosen • Discuss each option with the class using "basketball not ping-pong" questioning techniques focussing on learners who do not normally volunteer answers. Explain why each statement is accurate / not accurate. • Make sure to explain that those options that are incorrect are very common misconceptions which many adults would get wrong. • Ask the learners if any of them have any additional information / comments on the question and answers Allow 2 minutes for learners to update their sheets as required.	Focus on the teacher Provide feedback Engage in discussion	
	TIME CHECK – 14:17		

Extract from lesson plan showing the phase of the lesson where the concept cartoon was used



SPEEDY STARTER

NAME: Scarlett

Where do we get our energy from?

I think we get our energy when we sleep

No, we get our energy from the sun like plants

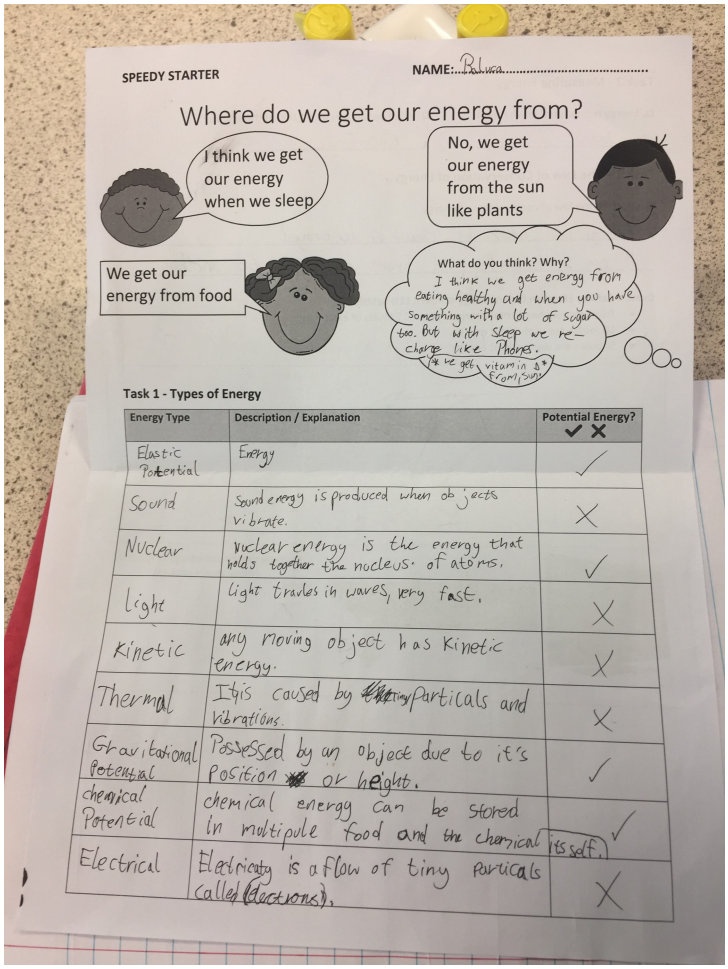
We get our energy from food

What do you think? Why?

I think we get our energy from food because food has Sugar, carbs

Task 1 - Types of Energy

Energy Type	Description / Explanation	Potential Energy? ✓ ✗
elastic Potential	energy Stored by an object when it is Stretched or Squashed	✓
Sound	Sound energy is produced when objects Vibrates cose waves of air pressure to travle through the air	✗
Nuclear	Nuclear energy is the energy that holds together the nucleus of atoms. By Combining or Splitting atoms we can create huge amounts of energy	✓
Light	Most Light Energy comes from the Sun. Light Travels in Waves. It travels extremly fast	✗
Kenetic energy	Kenetic energy it the Scientific term that we use for movement energy any moving object is creating Kenetic energy	✗
thermal energy	We get most of our thermal energy here on earth from the Sun	✗
Gravitational Potential	This energy is possessed by an Object due to its position or height it has stored energy that is released when the object Falls	✓
Chemical Potential	This is energy which can be stored in chemicals (for example food) holds chemical energy that the object to convert into the other energy that we need	✓
electrical	this energy is a results of a flow of tiny particals around a wire	✗



SPEEDY STARTER

NAME: Rahma

Where do we get our energy from?

I think we get our energy when we sleep

No, we get our energy from the sun like plants

We get our energy from food

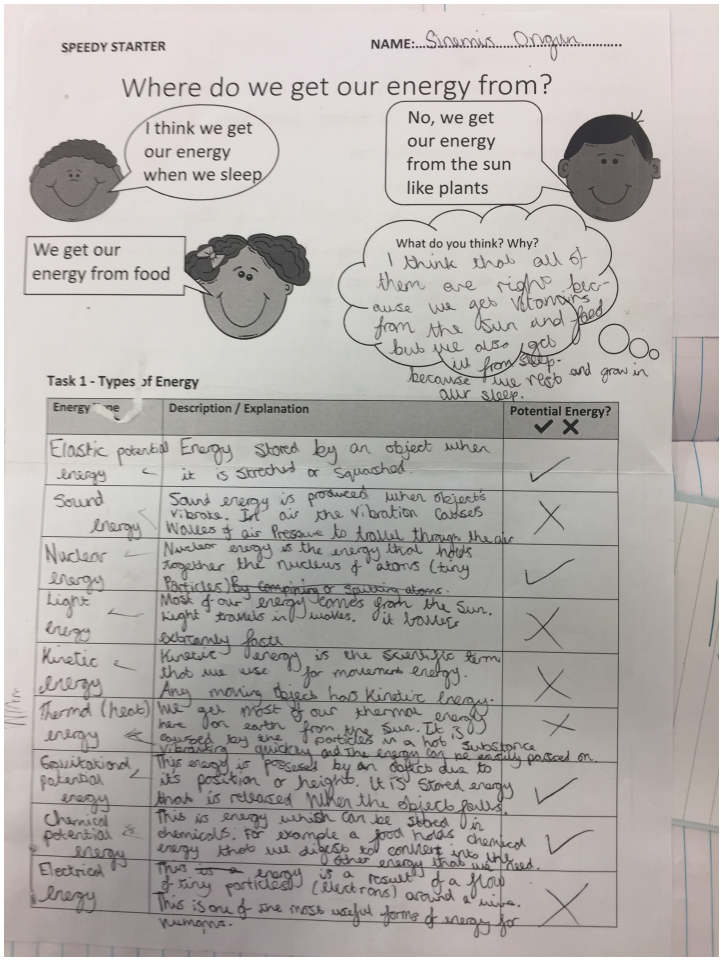
What do you think? Why?

I think we get energy from eating healthy and when you have something with a lot of sugar too. But with sleep we re-charge like Phones.

(& we get vitamin D* From the sun)

Task 1 - Types of Energy

Energy Type	Description / Explanation	Potential Energy? ✓ ✗
Elastic Potential	Energy	✓
Sound	Sound energy is produced when objects vibrate.	✗
Nuclear	Nuclear energy is the energy that holds together the nucleus of atoms.	✓
Light	Light travles in waves, very fast.	✗
Kinetic	any moving object has Kinetic energy.	✗
Thermal	It is caused by particals and vibrations.	✗
Gravitational Potential	Possessed by an object due to it's position or height.	✓
chemical Potential	chemical energy can be stored in multipule food and the chemical itself.	✓
Electrical	Electricity is a flow of tiny particals called (electrons).	✗



SPEEDY STARTER NAME: Savannah Dingley

Where do we get our energy from?

I think we get our energy when we sleep

No, we get our energy from the sun like plants

We get our energy from food

What do you think? Why?
I think that all of them are right because we get Vitamins from the sun and food but we also get it from sleep because we rest and grow in our sleep.

Task 1 - Types of Energy

Energy Type	Description / Explanation	Potential Energy? ✓ ✗
Elastic potential energy	Energy stored by an object when it is stretched or squashed.	✓
Sound energy	Sound energy is produced when objects vibrate. In air the vibration causes waves of air pressure to travel through the air	✗
Nuclear energy	Nuclear energy is the energy that holds together the nucleus of atoms (tiny particles) By combining or splitting atoms.	✓
Light energy	Most of our energy comes from the Sun. Light travels in waves. It travels extremely fast.	✗
Kinetic energy	Kinetic energy is the scientific term that we use for movement energy. Any moving object has Kinetic energy.	✗
Thermal (heat) energy	We get most of our thermal energy here on earth from the Sun. It is caused by the particles in a hot substance vibrating quickly and the energy can be easily passed on.	✗
Gravitational potential energy	This energy is possessed by an object due to its position or height. It is stored energy that is released when the object falls.	✓
Chemical potential energy	This is energy which can be stored in chemicals. For example a food holds chemical energy that we digest to convert into other energy that we need.	✓
Electrical energy	This is a energy is a result of a flow of tiny particles (electrons) around a wire. This is one of the most useful forms of energy for humans.	✗

Examples of learners work when completing the concept cartoons.

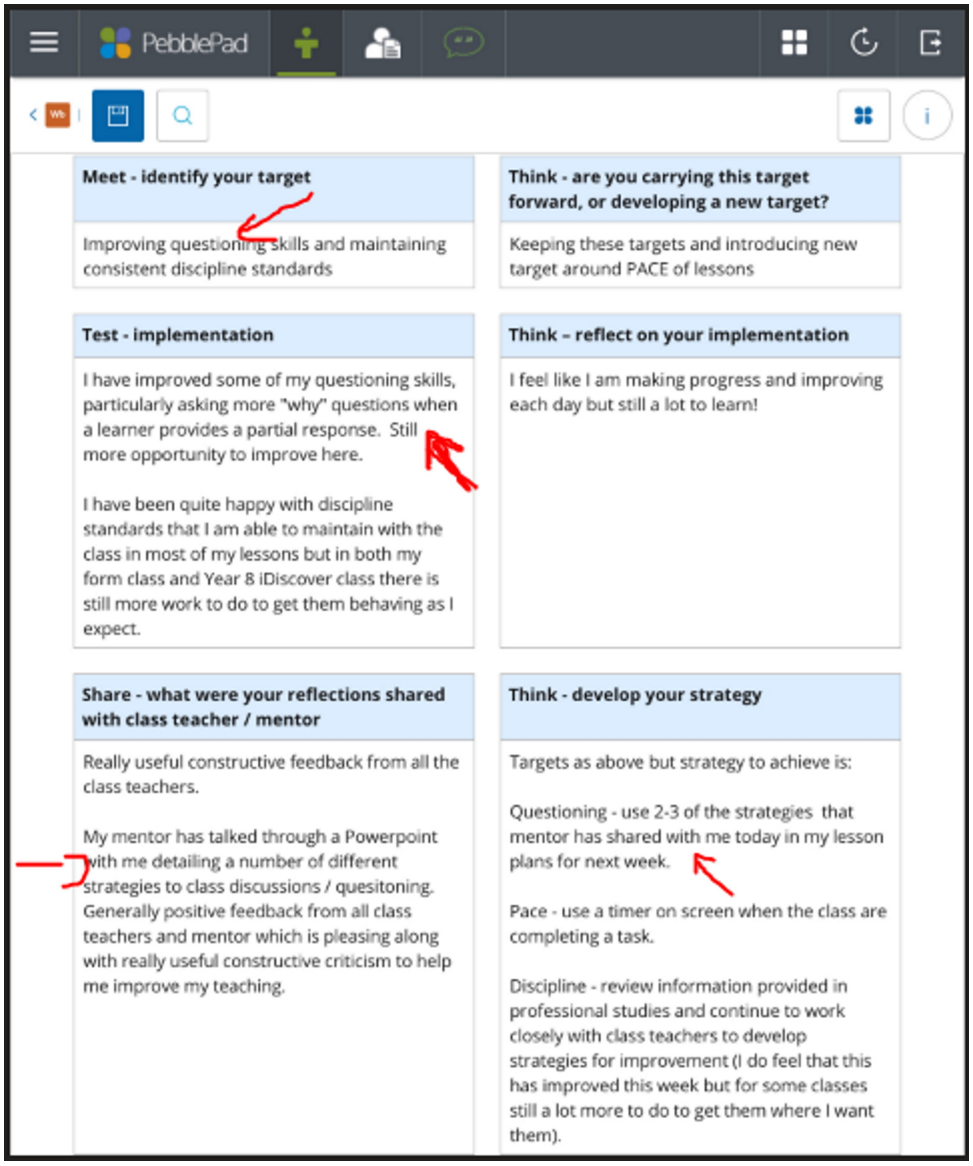
In the lesson (as per the lesson plan) I went through the possible answers with the class and concluded that we get our energy from food. Whilst I did give the class a couple of minutes to update their sheets with the correct answer if required, it is apparent from reviewing a sample of their worksheets that a lot of the learners left their initial guesses on the worksheet which in some cases were not correct.

When reflecting on this lesson after reviewing the work completed by the learners I have concluded that I need to be more explicit in my instructions in terms of updating the sheet to show the correct answer. I could have even added a section where the correct answer could have been written by all learners. I will consider this approach in future lessons.

General - Throughout placement - All Year Groups

Developing Questioning Skills

One of my targets in block 1 of PTE1 has been to develop my questioning skills during class discussion. This has improved over the six weeks spent in school although this will remain as a target going into block 2. My mentor and I both consider this to be an area where improvement is always possible and the benefits to learning are potentially significant.



Example weekly reflection detailing focus on developing questioning skills

Lesson Plan – Step 1 Cynllun Gwers – Cam 1

Student-teacher	Andrew Harris	Class:	9FX
AoLE or Subject	Science & Technology (iExplore)	Date:	06/12/2019
Lesson Focus:	Electrophoresis and DNA Profiling		
Meaningful links to Curriculum	Donaldson iExplore curriculum (Pioneer School). Key Pedagogical Principle – *Good teaching and learning creates authentic contexts for learning.*		
Meaningful links to: Cross Curricular Responsibilities	Literacy – Describing the results of the electrophoresis. Writing arguments for / against a national DNA database.		

Personal Targets (Linked to QTS and identifed in weekly review)

Questioning skills – using some techniques shared by my mentor – Accept, Build, Challenge; Pose, pause, pounce, bounce.



Consistent discipline expectations.

Pace – get the learners onto task quickly to maximise use of time.

Learning Objectives (focus on Learning- use accessible vocabulary):
The pupils will learn: • Analysis of real life electrophoresis gels • Ethical debate about the pros and cons of a national DNA database

Success Criteria (clearly linked to each Learning Objective and related to the process and/or product of learning)	Assessment of Pupils' Learning Evidence (What have the learners to say/write/do/produce – to demonstrate learning)
All learners to complete the electrophoresis worksheet and engage in class discussion. All to input into character statement worksheets.	Questioning during the lesson. Circulation amongst the class during completion of task. Plenary.

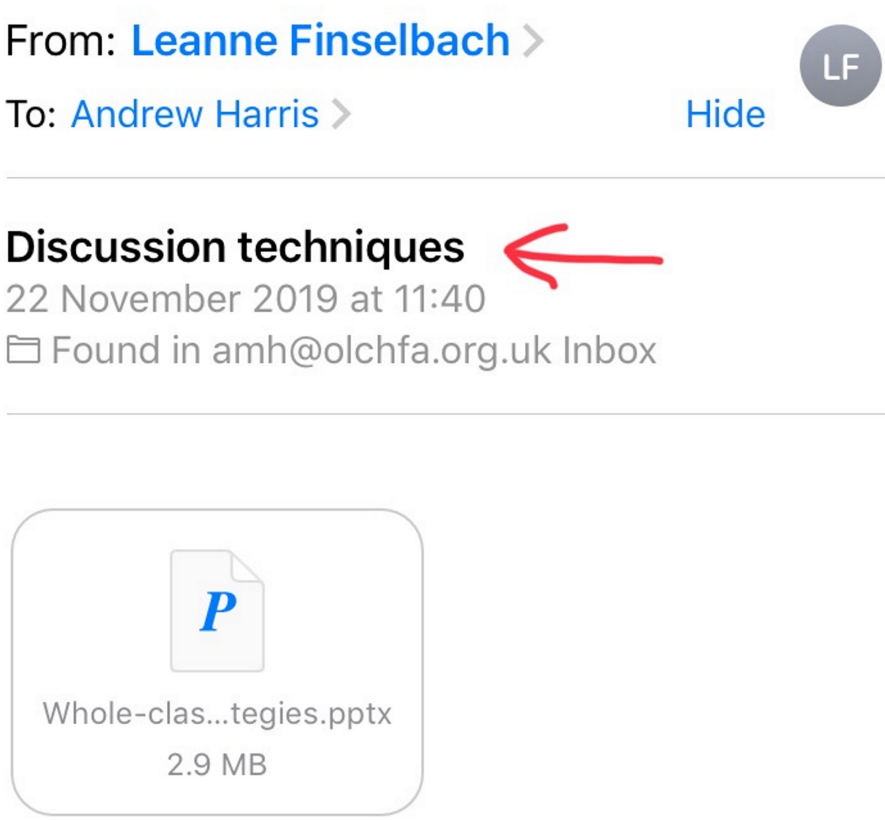
Lesson plan focussing on developing questioning skills

Lesson Plan – Phase 1
Evaluation of the Learning Experience
(include references to QTS)

Evaluation of Pupil Learning	
Evidence of Learning (including attitude to learning over time))	All learners were please and able to review their electrophoresis gels and produce a written description of what had happened. This enabled the learners to identify the father in this paternity test. They also engaged well in the ethical debate section of the lesson and I have subsequently collated their feedback into a single sheet which will be shared with the learners by the classroom teacher next lesson.
Next Steps for Progress	As above. This was my last lesson with this class for a few weeks so I will engage with Mrs Finselbach to understand where we are up to when I return.

Reflective Analysis of Teaching and Strategies For Development – including justification/rationale for pedagogical choices	
Evidence of my Effective Practice	Feedback from classroom teacher: • Good to mix up the groups for the debate task • Nice resources
Areas for my Development Personal Targets for Progress	• Remember to stamp on any low level disruption when you are talking. • Learners were very quiet during the discussion – think about using discussion mats (to be shared with Andrew next term). My Reflections This lesson went well, and I was pleased to be able to use some of the questioning techniques that my mentor used. Accept, build, challenge worked well and meant that the class were talking a lot more than me. Increasing wait time also worked well but it may have impacted the pace of the lesson as the long pauses slowed us down a couple of times. It was interesting how the class needed some work to keep them quiet whilst we were on the first task but were quiet on the second task when they were supposed to be in discussion!

Lesson plan reflections focussing on developing questioning skills



Email from my mentor sharing the PowerPoint that she had previously talked me through on developing class discussion and questioning skills

General - Throughout placement - All Year Groups

Showing the Learner HOW they will achieve Learning Objective / Instructions

Identifying the learners' current level of understanding and being clear with them about what the Learning Objectives and Success Criteria are provides a great platform for the learners to make progress. However, without clear explanations and instructions from the teacher, the learners will struggle to make the required progress. This is an area that I feel has improved over the course of Block 1 of PTE1 as demonstrated by teacher feedback shown below.

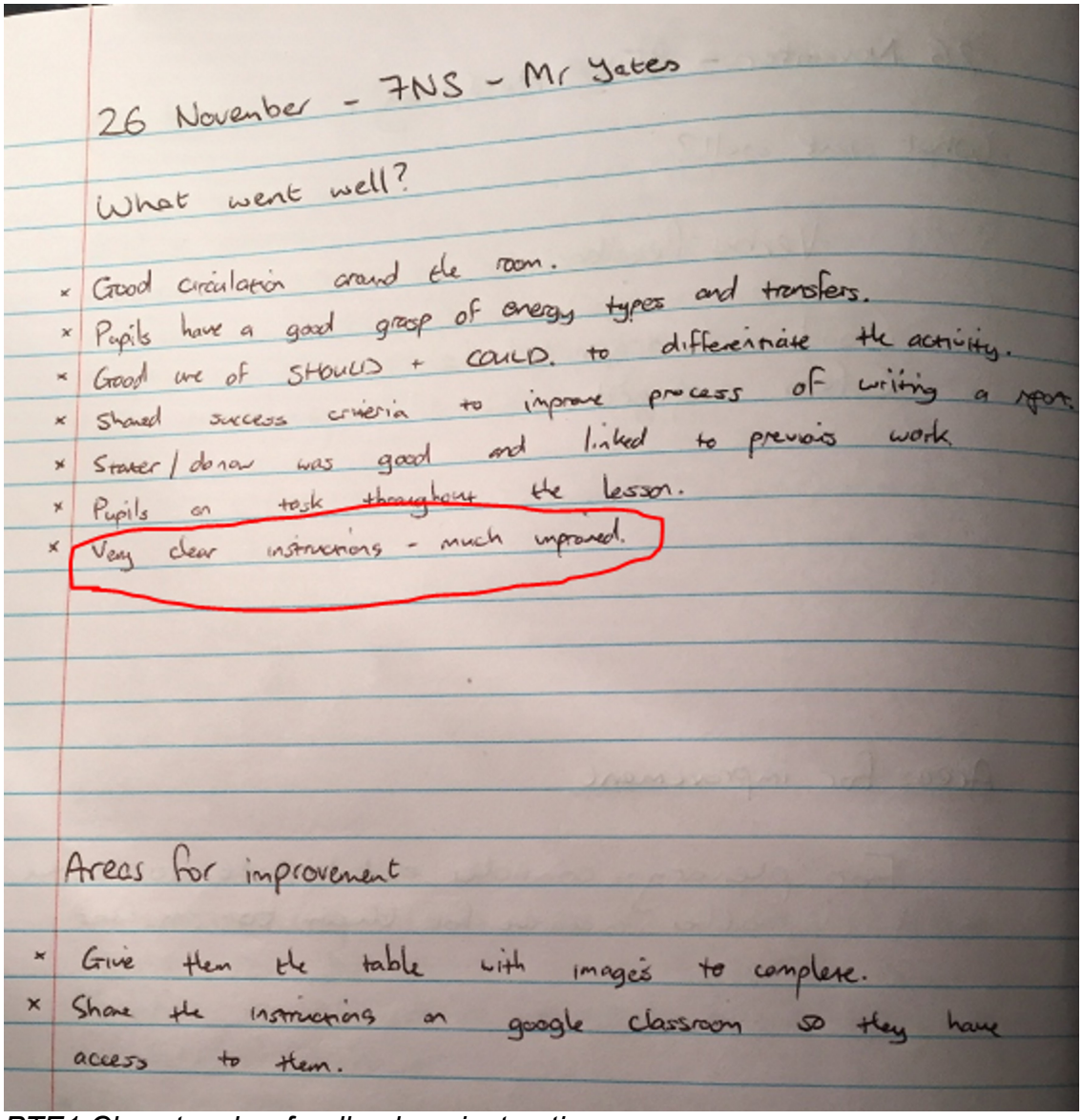
Monday 18 November - 10DSC - Mrs Bravin

What went well?

Good starter
Good pupil engagement
Nice visual video
Good explanation of balancing equation.
Good praise of pupils
Lovely way to display balancing equations
which the pupils learnt from.
Really well planned

Areas for improvement.

Keep up the enthusiasm



PTE1 Class teacher feedback on instructions

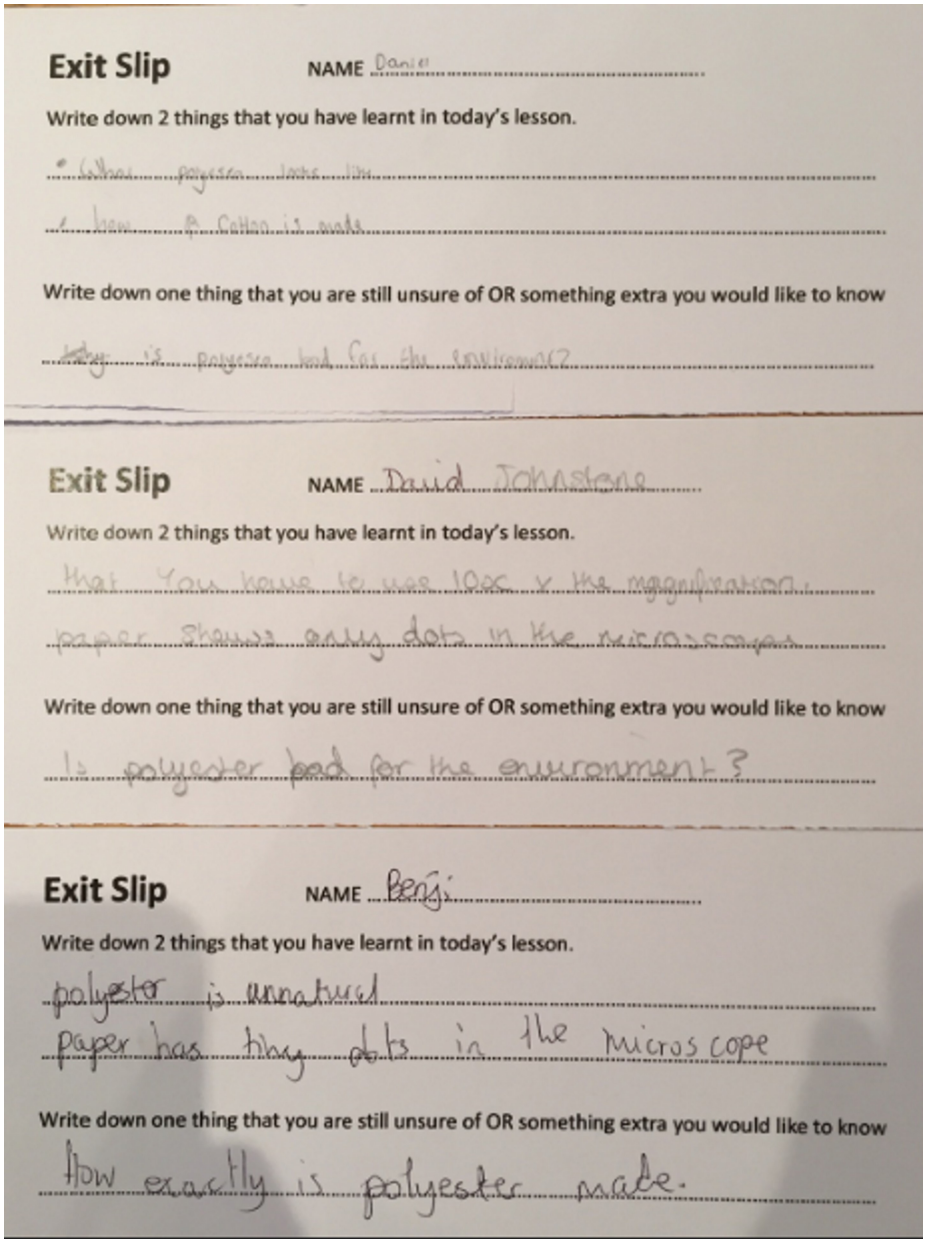
22 November - Year 9 (9FX - Forensics)

Plenary - Exit Tickets

During this lesson the class had been examining different types of fibres under the microscope and drawing diagrams of the fibres in their books. At the end of the lesson I instructed the class to complete "exit tickets" that asked two questions:

- Write down two things that you have learnt in today's lesson.
- Write down one thing that you are still unsure of or something extra you would like to know.

After the lesson I reviewed the exit slips and I could see some similarities in what was learnt (most common answers were "calculating magnification" and "what different fibres look like under a microscope"). There were also some common themes in answering the second question, particularly about why polyester was considered to be bad for the environment and how it is made. I took the opportunity to discuss this topic briefly with the class at the start of the next lesson the following week (first 5-10 minutes of the lesson).



Exit Slip NAME Daniel

Write down 2 things that you have learnt in today's lesson.

- (What polyester looks like
- how A Cotton is made

Write down one thing that you are still unsure of OR something extra you would like to know

- why is polyester bad for the environment?

Exit Slip NAME David Johnstone

Write down 2 things that you have learnt in today's lesson.

that you have to use 10x + the magnification.
paper shows only dots in the microscope

Write down one thing that you are still unsure of OR something extra you would like to know

Is polyester bad for the environment?

Exit Slip NAME Benji

Write down 2 things that you have learnt in today's lesson.

polyester is unnatural
paper has tiny dots in the microscope

Write down one thing that you are still unsure of OR something extra you would like to know

how exactly is polyester made.

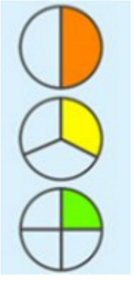
Completed exit ticket examples

DO NOW – from Exit Tickets

Polyester

- **Is polyester bad for the environment?**

Q. What proportion of the micro-plastics in the world's oceans come from polyester and other man-made fibres?



Half

A third

A quarter

35% of all microplastics released in oceans are from synthetic textiles.

Each time an item of polyester clothing is washed, up to 700,000 microscopic fibres are released and make their way into our oceans, where they are swallowed by sea life and become incorporated into the food chain and potentially ending up on our plates.

Starter – from Exit Tickets

Polyester

- **How is polyester made?**

https://youtu.be/W-V1GH4Gt2I?t=29

Slides from the lesson following collection of the exit tickets

Reinforce Cross-Curriculum Responsibilities

08 October 2019 19:20

Good teaching and learning regularly reinforces Cross-Curriculum Responsibilities, including literacy, numeracy and digital competence, and provides opportunities to practice them.

26th November 2019 - Year 7 (7NS)

End of Topic Energy Report (Literacy & Digital Competence)

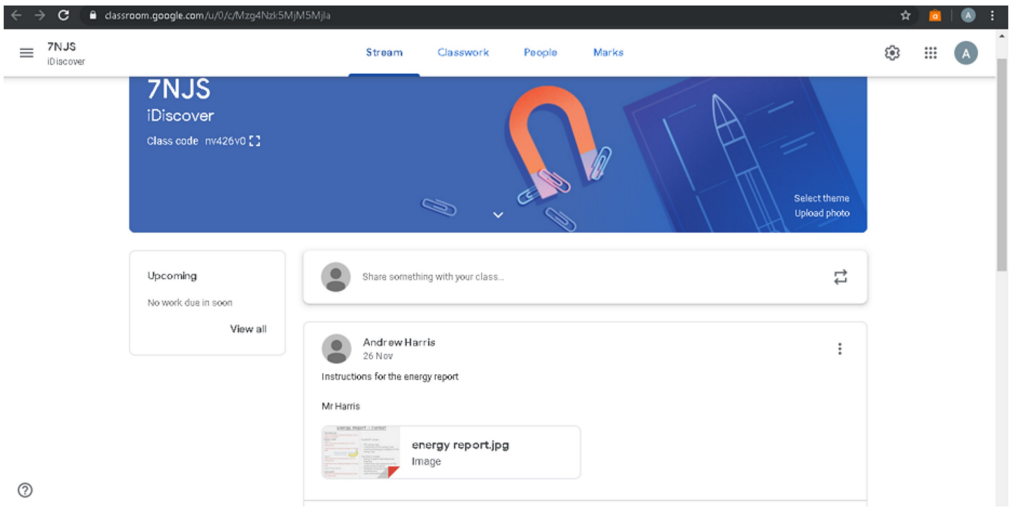
In the Year 7 class I had spent the last 2 weeks on the topic of ENERGY TYPES. In order to consolidate and embed this learning, I set the final task for the topic to produce an Energy Report on the 9 types of energy. The learners had to complete research for this task using their books and also had a lesson where they could use laptops to complete further research online.

The learners enjoyed this task (even though most of them had to finish the task as homework) and their recall on the different energy types appears to be good (tested through starters and plenaries since finishing the topic).

Cross Curricular
To assist the learners in class and whilst completing the task as homework I added the success criteria to the Google Classroom for this class. They were writing a report in their own words (Literacy links) using internet research to build on their knowledge of this subject (DCF).

For some learners I provided a scaffolded template for the report as this mixed ability class has a very wide range of abilities (MAT and ALN). I set the success criteria using "must do" and "could do" tasks related to the report which expanded the potential scope of the task for the more able learners.

This task builds upon the learners knowledge that they have built up over the last 4 lessons. This task was designed to embed the existing learning about the 9 energy types.

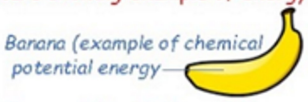


Energy Report – Format

Introduction
Short (2 sentences) describing what this is report is all about

Energy Types
Type 1
Short definition and description of the energy type

Labelled picture showing example of energy type



Type 2
Short definition and description of the energy type

Labelled picture showing example of energy type

Type 3-9 (as above)

Conclusion
Short (2-3 sentences) summing up what you have done

References – *Where did you find info for report?*

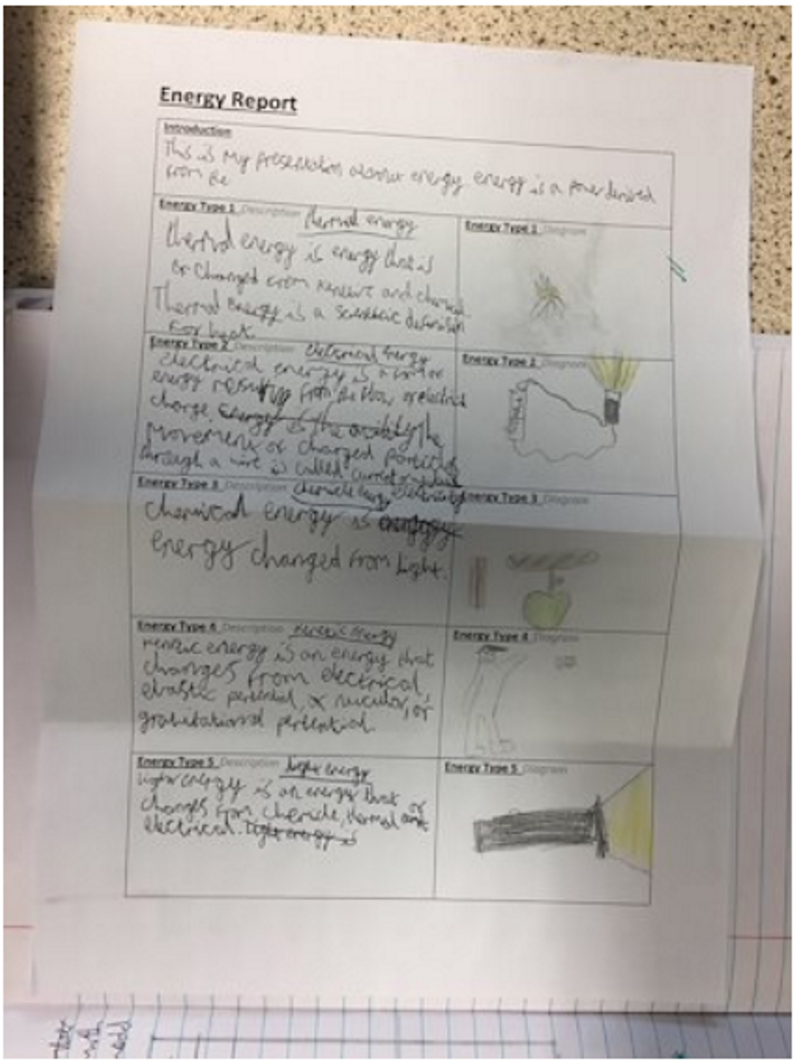
You MUST include:

- The energy type
- A definition of this energy type
- A picture showing an examples of this energy type

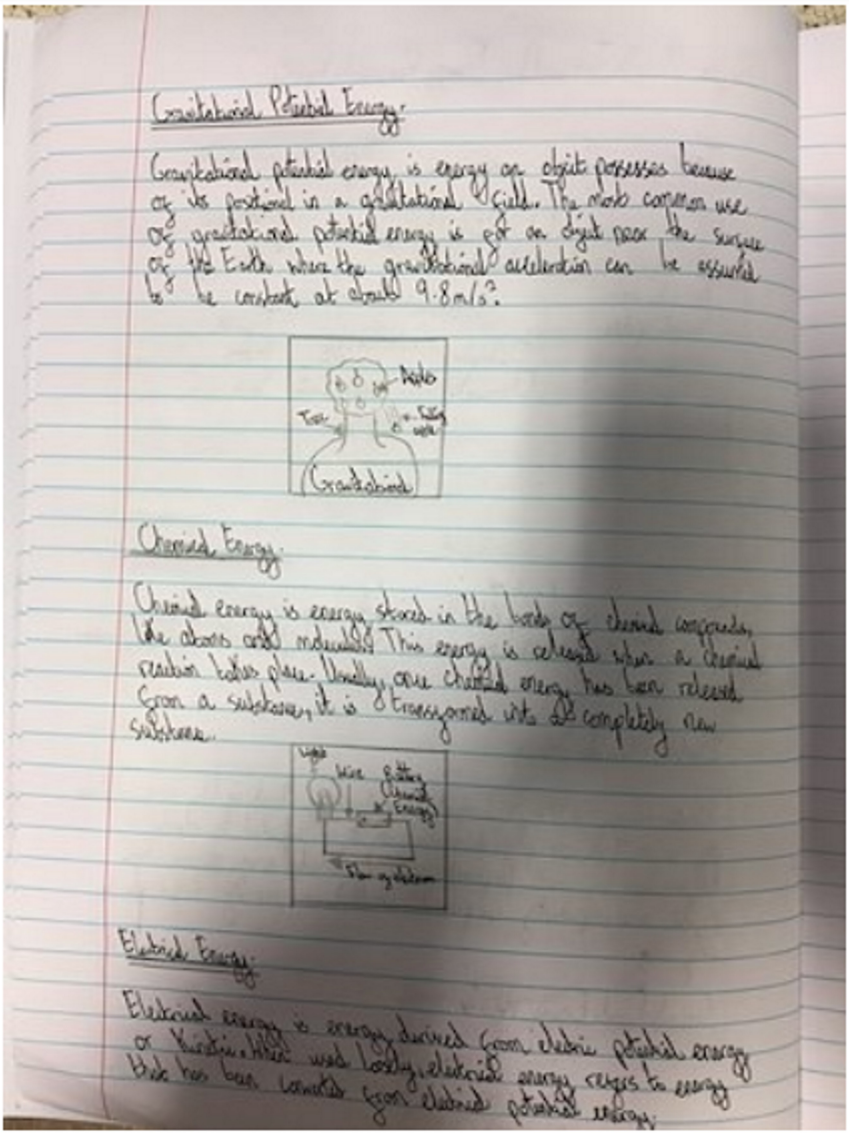
You COULD include:

- Energy transfer information and diagrams
- A definition and explanation of the conservation of energy
- Examples of energy calculations including input, useful and wasted energy

Success Criteria / Requirements published on the Google classroom



Example of completed scaffolded version of the energy report



Example page from energy report of one of the more able Year 7 learners in the class.

12th November 2019 - Year 7 (7NS)

Using Water - Numeracy Rich Task

Within the Scheme of Work for Year 7 Science there are three "Numeracy Rich Tasks" that must be completed by all learners over the year. There is one of these tasks per major topic (Space, Water and Cells & Reproduction).

These tasks are focussed on assessing the learners' current ability in numeracy. These are "key assessments" in the scheme of work and are teacher marked.

This was my first experience of a Numeracy Rich Task with Year 7. There is no mark scheme with the task so I completed the task myself before the lesson to make sure that I could assist any learners in the lesson.

I set a starter activity for the learners to complete before completing the key assessment task which was very similar to the first question on the Numeracy Rich Task. This was designed to help the learners get going quickly on the first question on the task worksheet.

My expectation before this lesson was that the majority of learners in the class would be able to complete this task without much difficulty. However, in the lesson it became apparent that most of the learners really struggled with the task. Whilst the maths was relatively simple, the learners found it very difficult to extract the correct information and figures from the text and tables in order to build the calculations required. I found this very interesting and I will consider this issue when planning lessons in the future. Simply being able to complete the Maths doesn't mean that you can interpret and manipulate the data. It is also noted that recent GCSE Science papers often present information for questions within text and tables so it will be important for the learners to improve on this skill.

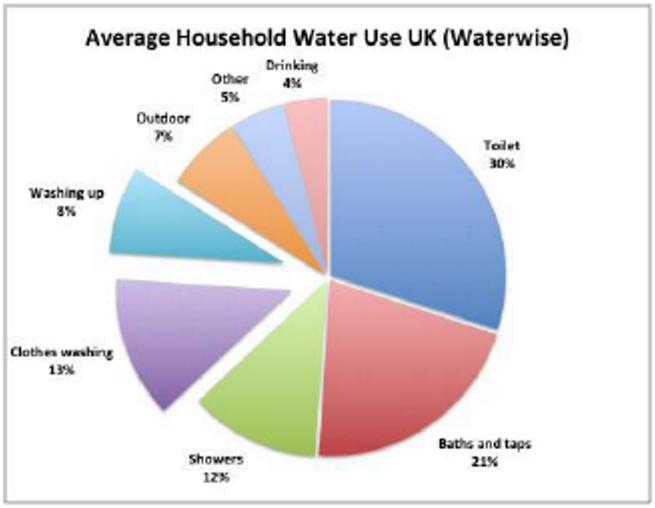
Using Water – Numeracy Rich Task

The UN say that a human being needs 50 litres of water per day in order to prepare meals and to have enough for personal hygiene. However, many people in the developing world must get along with only 20 litres water per day.

Every person on the planet needs water to live with the recommended amount being 1.8 litres per day per person for drinking. However, drinking isn't the only use we have for water. Think of how many ways you use water at home: washing clothes, dishes and yourself requires a lot of water, and the older style toilets can use up to 13 litres per flush. Without even considering factories, industry and agricultural use, our water usage in the UK is very high compared to many parts of the world.

Only about 0.8% of the total water on the Earth is accessible freshwater. This isn't much to feed the 7 billion people on the planet.

Below are figures that display how water is used in the UK.



Country	Amount of water used by one person in one day (litres/day)
United Kingdom	150
Kenya	???

Using Water – Numeracy Rich Task

TASK 1:

- Using calculations work out how much water a household in the UK with 4 people in uses in one day.
- How much would this household use in one year

- The amount of water used by one person per day in Kenya is around one fifth the amount used by someone in the UK. Calculate how much water a household of 4 people would use per day in Kenya.
- How much would this 4 person household in Kenya use in one year?

Display your answers in a suitable format with suitable units. Show your workings clearly below:

Bullet point 1:
150 x 4 = 600 litres/day

Bullet point 2:
600 x 365 = 219,000 litres/year

Bullet 3
600 / 5 = 120 litres/day (or alternatively 150 / 5 x 4 = 120 litres/day)

Bullet 4
120 x 365 = 43,800 litres/year (or alternatively 219,000 / 5 = 43,800 litres / year)

TASK 2:

- Using the pie chart, present using any method you prefer how much water the average household uses to complete different tasks in litres:

N.B. THE QUESTION IS UNCLEAR BUT I ADVISED THE CLASS TO ASSUME AN "AVERAGE HOUSEHOLD" TO BE A 4 PERSON HOUSEHOLD IN THE UK (I.E. USING 600 LITRES / DAY OR 219,000 PER YEAR)

Usage Type	%	litres / day	litres / year
Toilet	30	180	65,700
Bath / taps	21	126	45,990
Shower	12	72	26,280
Clothes washing	13	78	28,470
Washing up	8	48	17,520
Outdoor	7	42	15,330
Other	5	30	10,950
Drinking	4	24	8,760

Using Water – Numeracy Rich Task

TASK 3:

- Using what you now know about water usage, what can could you and your family do at home to save water to allow our supplies to last longer. Think about the times during the day when you and your family use water (e.g. brushing your teeth, shower / bath, watering the garden, washing clothes, using the toilet).

Key opportunities at home to save water:

- Turn off the tap when brushing your teeth
- Take shorter showers
- Take showers instead of baths (albeit you can't deduce this from the information provided in this worksheet)
- Plant drought tolerant plants to reduce garden watering
- Install a water-butt to use rainwater from your roof to water the garden
- Install a modern "dual flush" toilet.
- Only wash full loads in the washing machine
- Only wash full loads in the dishwasher
- Wash the car less often

Numeracy Rich Task Worksheet (with my answers added in)

NAME:……..

Average Water Usage

Country	Water Used Per Person Per Day
USA	235 litres / day

Calculate how much water a USA household with four people living in it would use per day. Show your workings.

How much would this household use per year? Show your workings.

Speedy Starter for this lesson

Evaluation of Pupil Learning	
Evidence of Learning (including attitude to learning over time))	The learners completed as much of the Numeracy Rich Task as they could (MAT learners completed and moved onto the Stretch & Challenge task but some only got to question 2). The starter allowed the learners to attempt a similar question to Task 1 on the numeracy task which appeared to assist in them completing the first task. The learners' attitude to learning was generally good across the class with all learners keen to complete and understand the task.
Next Steps for Progress	I was surprised by how hard a lot of the learners found this task. Whilst they could all do the maths once they knew what numbers they had to ad / subtract / multiply they found it very difficult to extract the correct information from the questions in order to build the correct calculations. This is a skill that will be required for a multitude of tasks in their adult life. It is also worth remembering that 2018 GCSE Science papers had a lot of these kind of questions with text / tables and graphs in the same question, requiring the learners to extract this information and perform calculations. This is something to focus on in the future for my teaching. | Missing next lesson for bridging but the next lesson I am leading will be a revision lesson for the upcoming test.

Extract from lesson plan reflections

22 November 2019 - Year 9 (9FX)

Magnification - Key Numeracy Skill

As part of the school's "iExplore" curriculum the Science & Technology department runs a Forensics course for Year 9s. I have been leading the teaching for one of these classes.

One lesson which I delivered was focussed on viewing and analysing different fibre samples under a microscope. The learners had to take samples of fabric and mount them suitably on microscope viewing slides before viewing the samples and drawing diagrams of what they saw.

A key numeracy skill when working with a microscope is to understand the total magnification provided by the microscope. Most light microscopes have magnification provided by both the eyepiece lens and the objective lens. In order to calculate the total magnification, the eyepiece lens magnification must be multiplied by the objective lens magnification.

A common misconception amongst learners is that they incorrectly believe that they need to add together the two magnification lens to calculate the total magnification instead of multiply the two figures.

I spent some extra time in the direct teaching part of the lesson focussing on calculating the total magnification and also set the task of calculating the magnification for each fibre sample being drawn in the learners books. I circulated the class during the task and where required provided some further guidance to learners on completion of the task, paying particular attention to calculating total magnification.

In Your Books

Material	Magnification			Diagram
	Eyepiece	Objective	Total	

Calculating Magnification

Total Magnification:

 X  = 40 X

4X Scanning Objective 10X Eyepiece

 X  = 100 X

10X Objective 10X Eyepiece

 X  = 400X

40X Objective 10X Eyepiece



Slides from PowerPoint presentation used during direct teaching part of the lesson.

Teaching & Core Learning **45 minutes**	Run through slides 2-6 and explain and discuss content using questioning techniques discussed with mentor (ABC, Pose, Pause Pounce etc). Spend some additional time on slide 6 (Calculating Magnification) to ensure that learners understand the method of calculating total magnification. Test the class through questioning different learners in the class with examples put up on the board getting them each to calculate total magnification. Discuss and demonstrate how they will capture samples on their slides Ensure learners have produced the table in their books before allowing them to retrieve a microscope.

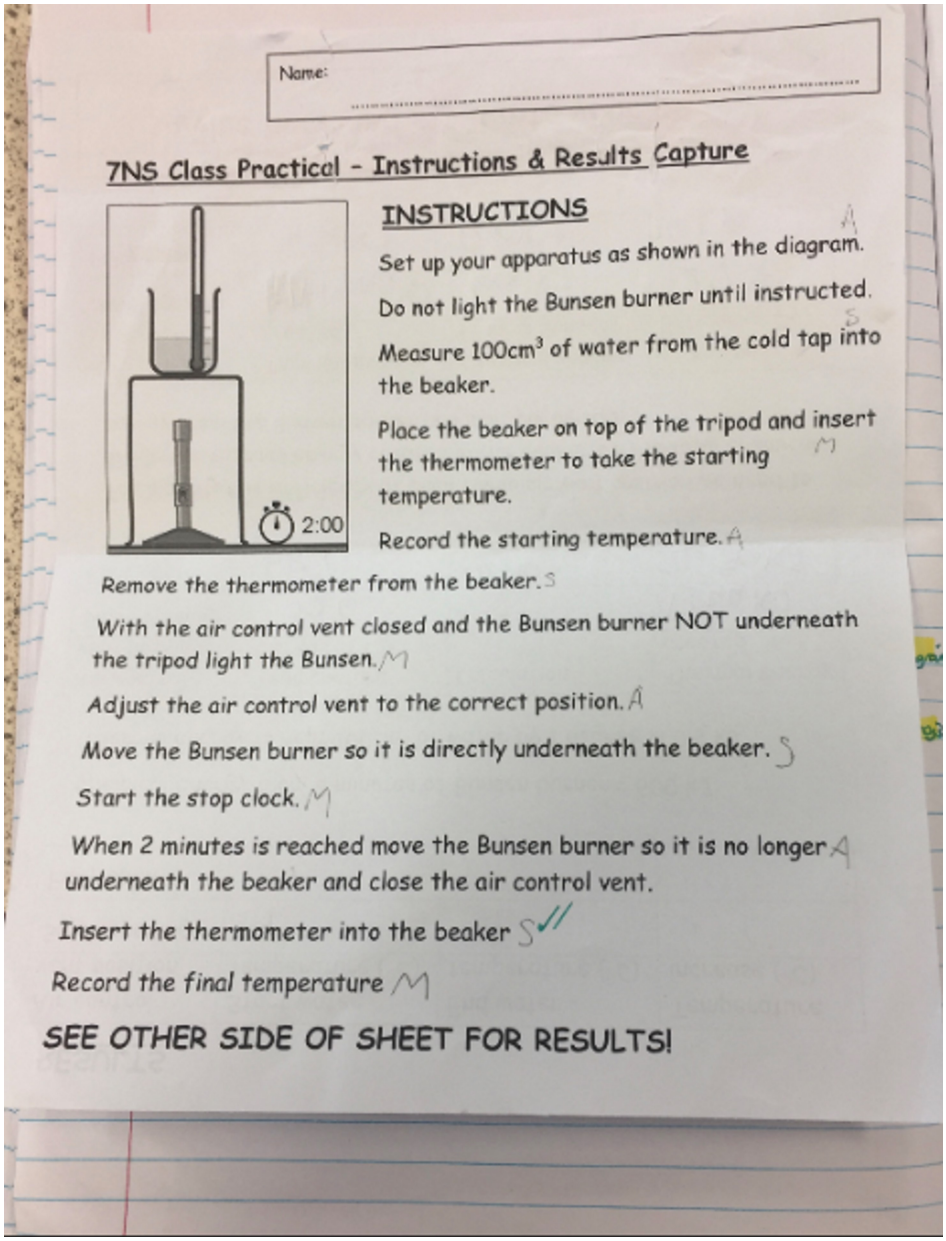
Extract from lesson plan for this lesson.

3 December 2019 - Year 7 (7NS)

Calculating Bunsen Burner Efficiency

I created this practical and calculation lesson in order to fulfil the requirements on the scheme of work for the learners to complete a practical experiment to measure and calculate percentage efficiency. The standard lesson on the scheme of work tested a hair-dryer efficiency drying a piece of wet paper but in discussion with the class teacher we agreed that an alternative lesson may be more engaging.

The calculations for the efficiency of the Bunsen burner required a number of steps so I made these individual steps on the worksheet. Some of the calculations would also require a calculator which a lot of the learners do not always bring to school so I created a look-up table to allow them to quickly find the correct results. This made the calculations more accessible for all learners and taught them a new skill (using a look-up table).



Name: .....

7NS Class Practical - Instructions & Results Capture

INSTRUCTIONS

Set up your apparatus as shown in the diagram. A

Do not light the Bunsen burner until instructed.

Measure 100cm^3 of water from the cold tap into the beaker. S

Place the beaker on top of the tripod and insert the thermometer to take the starting temperature. M

Record the starting temperature. A

Remove the thermometer from the beaker. S

With the air control vent closed and the Bunsen burner NOT underneath the tripod light the Bunsen. M

Adjust the air control vent to the correct position. A

Move the Bunsen burner so it is directly underneath the beaker. S

Start the stop clock. M

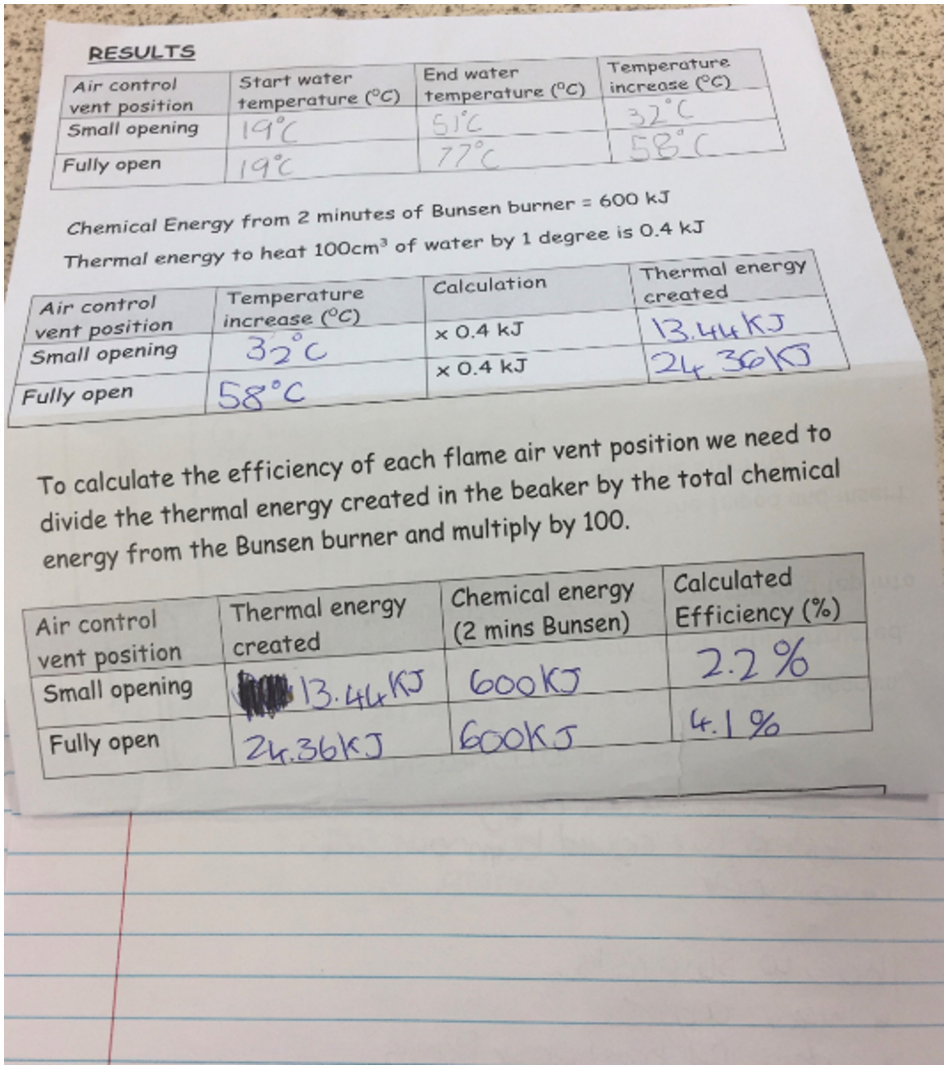
When 2 minutes is reached move the Bunsen burner so it is no longer underneath the beaker and close the air control vent. A

Insert the thermometer into the beaker S ✓✓

Record the final temperature M

SEE OTHER SIDE OF SHEET FOR RESULTS!

Worksheet instructions (initials indicate who in the group was going to complete each task on the method).



RESULTS

Air control vent position	Start water temperature (°C)	End water temperature (°C)	Temperature increase (°C)
Small opening	19°C	51°C	32°C
Fully open	19°C	77°C	58°C

Chemical Energy from 2 minutes of Bunsen burner = 600 kJ

Thermal energy to heat 100cm³ of water by 1 degree is 0.4 kJ

Air control vent position	Temperature increase (°C)	Calculation	Thermal energy created
Small opening	32°C	x 0.4 kJ	13.44KJ
Fully open	58°C	x 0.4 kJ	24.36KJ

To calculate the efficiency of each flame air vent position we need to divide the thermal energy created in the beaker by the total chemical energy from the Bunsen burner and multiply by 100.

Air control vent position	Thermal energy created	Chemical energy (2 mins Bunsen)	Calculated Efficiency (%)
Small opening	13.44KJ	600KJ	2.2 %
Fully open	24.36KJ	600KJ	4.1 %

Completed calculations

	A	B	C	D	E
1	Temperature Increase	Thermal Energy Increase (kJ)		Energy from Bunsen burner for 2 minutes	% Efficiency
2	20	x 0.42	8.4 kJ	600 kJ	1.4%
3	21	x 0.42	8.82 kJ	600 kJ	1.5%
4	22	x 0.42	9.24 kJ	600 kJ	1.5%
5	23	x 0.42	9.66 kJ	600 kJ	1.6%
6	24	x 0.42	10.08 kJ	600 kJ	1.7%
7	25	x 0.42	10.5 kJ	600 kJ	1.8%
8	26	x 0.42	10.92 kJ	600 kJ	1.8%
9	27	x 0.42	11.34 kJ	600 kJ	1.9%
10	28	x 0.42	11.76 kJ	600 kJ	2.0%
11	29	x 0.42	12.18 kJ	600 kJ	2.0%
12	30	x 0.42	12.6 kJ	600 kJ	2.1%
13	31	x 0.42	13.02 kJ	600 kJ	2.2%
14	32	x 0.42	13.44 kJ	600 kJ	2.2%
15	33	x 0.42	13.86 kJ	600 kJ	2.3%
16	34	x 0.42	14.28 kJ	600 kJ	2.4%
17	35	x 0.42	14.7 kJ	600 kJ	2.5%
18	36	x 0.42	15.12 kJ	600 kJ	2.5%
19	37	x 0.42	15.54 kJ	600 kJ	2.6%
20	38	x 0.42	15.96 kJ	600 kJ	2.7%
21	39	x 0.42	16.38 kJ	600 kJ	2.7%

Look-up table

On the Worksheet

Chemical Energy from 2 minutes of Bunsen burner = 600 kJ

Thermal energy to heat 100cm^3 of water by 1 degree is 0.42 kJ

Air control vent position	Temperature increase (°C)		Thermal energy created
Small opening		x 0.42	
Fully open		x 0.42	

Insert your results and calculations into the table

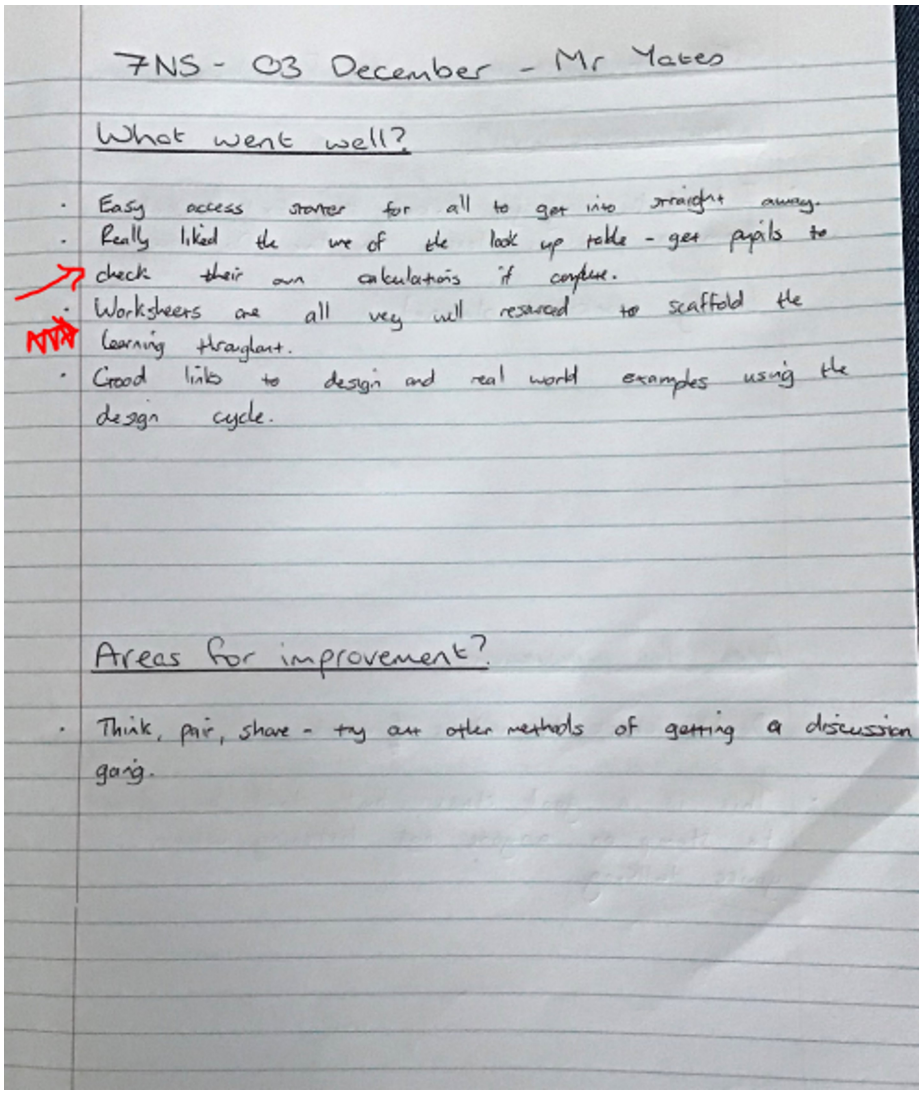
On the Worksheet

Efficiency of each flame is calculated by dividing the thermal energy created in the beaker by the total chemical energy from the Bunsen and multiplying by 100.

Air control vent position	Thermal energy created	Chemical energy (2 mins Bunsen)	Calculated Efficiency (%)
Small opening			
Fully open			

Insert your results and calculations into the table

Slides used as class completed the worksheet



7NS - 03 December - Mr Yates

What went well?

- Easy access starter for all to get into straight away.
- Really liked the use of the look up table - get pupils to check their own calculations if confident.
- Worksheets are all very well resourced to scaffold the learning throughout.
- Good link to design and real world examples using the design cycle.

Areas for improvement?

- Think, pair, share - try out other methods of getting a discussion going.

Teacher feedback

Tasks and resources - build on previous knowledge and engage interest

31 December 2019 17:10

Good teaching and learning sets tasks and selects resources that build on previous knowledge and experience and engage interest

21 November - Year 7 (7NS)

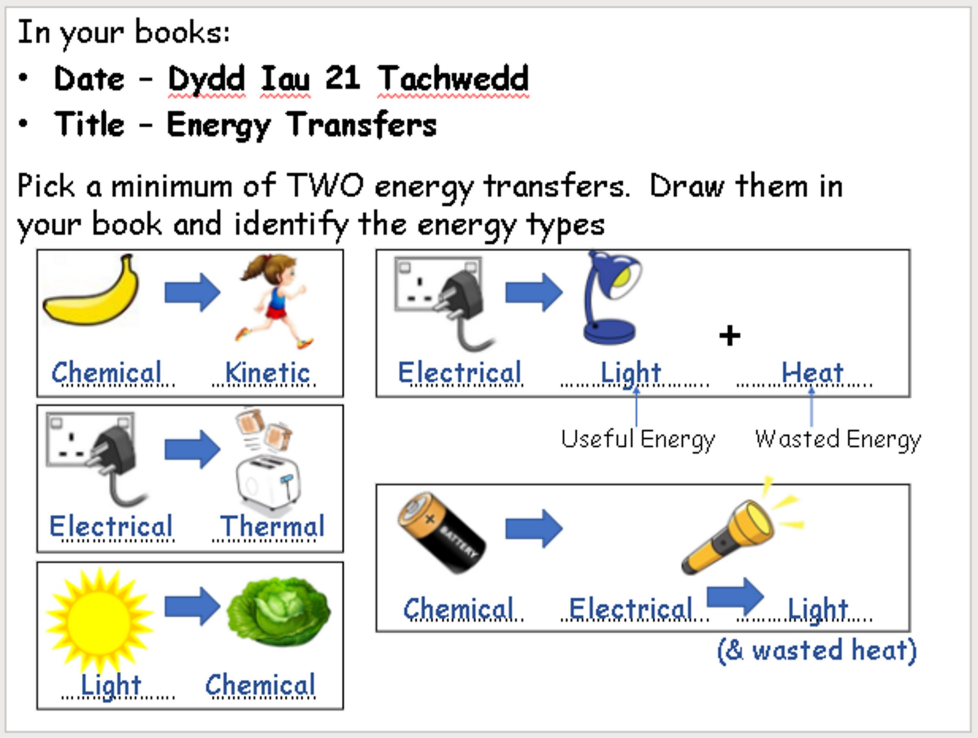
Energy Circus Lesson - Building on Previous Knowledge and experience AND engaging Interest

In this lesson I used a number of methods focussed on getting the learners to utilise previous knowledge gained from lessons in the last few weeks. This recall of previous knowledge then helped the learners answer further questions and then attempt to assess the energy types applicable to some real life "machines".

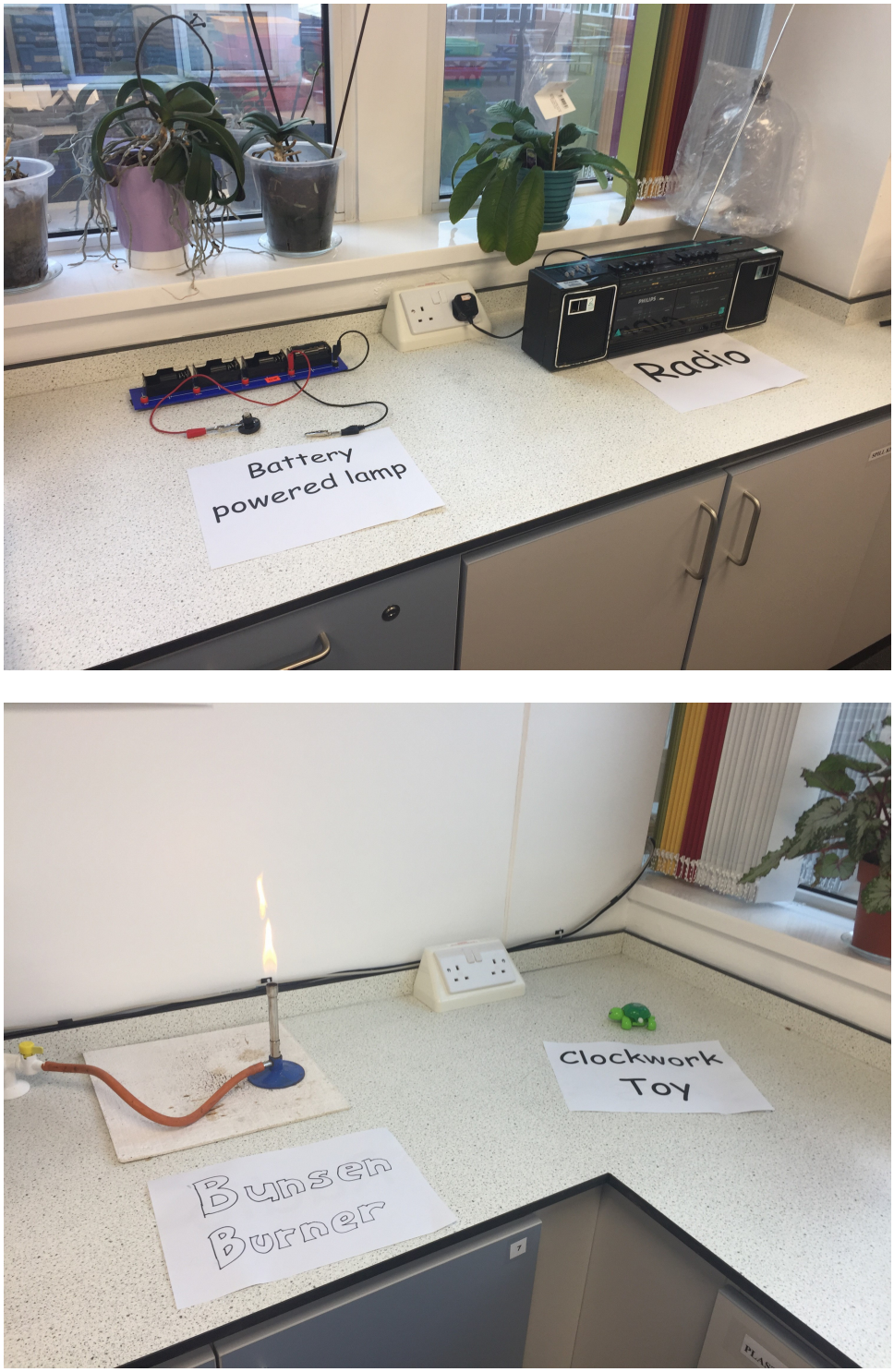
The starter for this lesson required learners to recall knowledge gained in previous lessons about energy types to answer some questions about energy conversions.

The main body of the lesson required learners to move around the classroom through a series of "stations" looking at various pieces of equipment / machines to assess what the input, output and waste energy types were. This engaged significant interest from the class. The learners very much enjoyed completing the task.

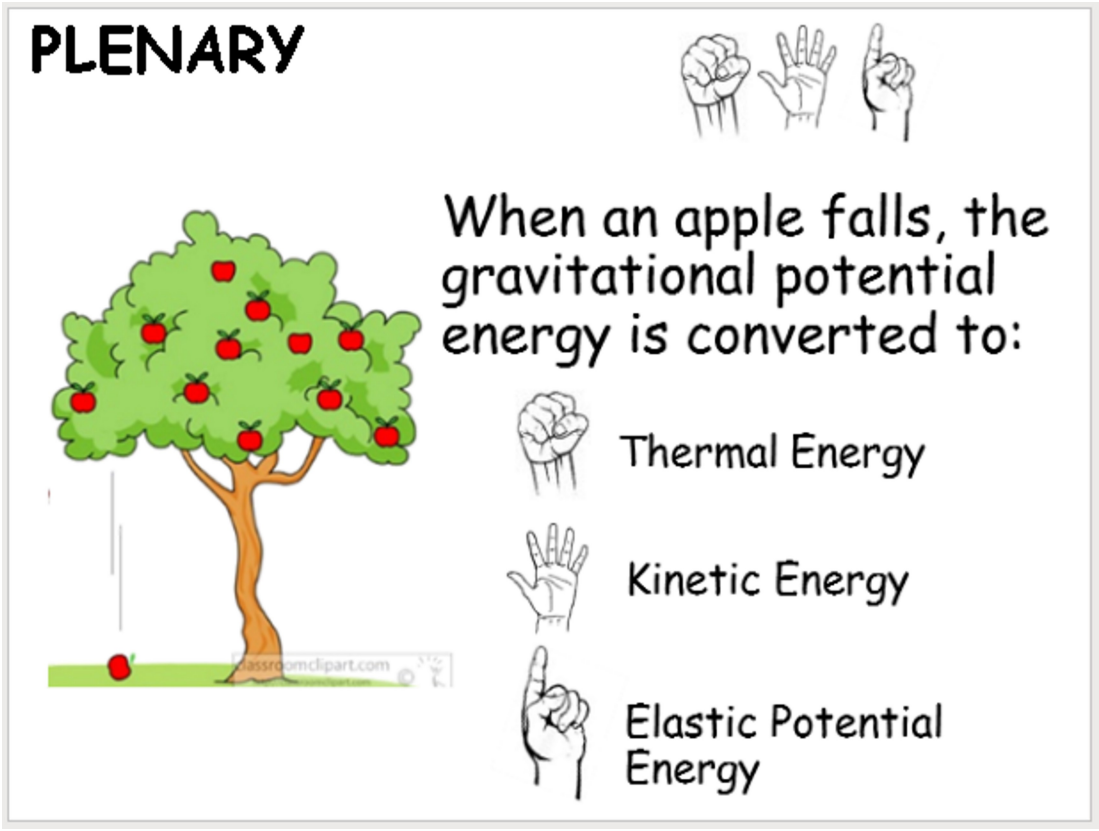
The plenary quiz tested the learners understanding of today's lesson but also included a question related to the law of conservation of energy which was covered in the previous lesson. It was pleasing to see when learners gave their answers that the vast majority could remember what this law meant.

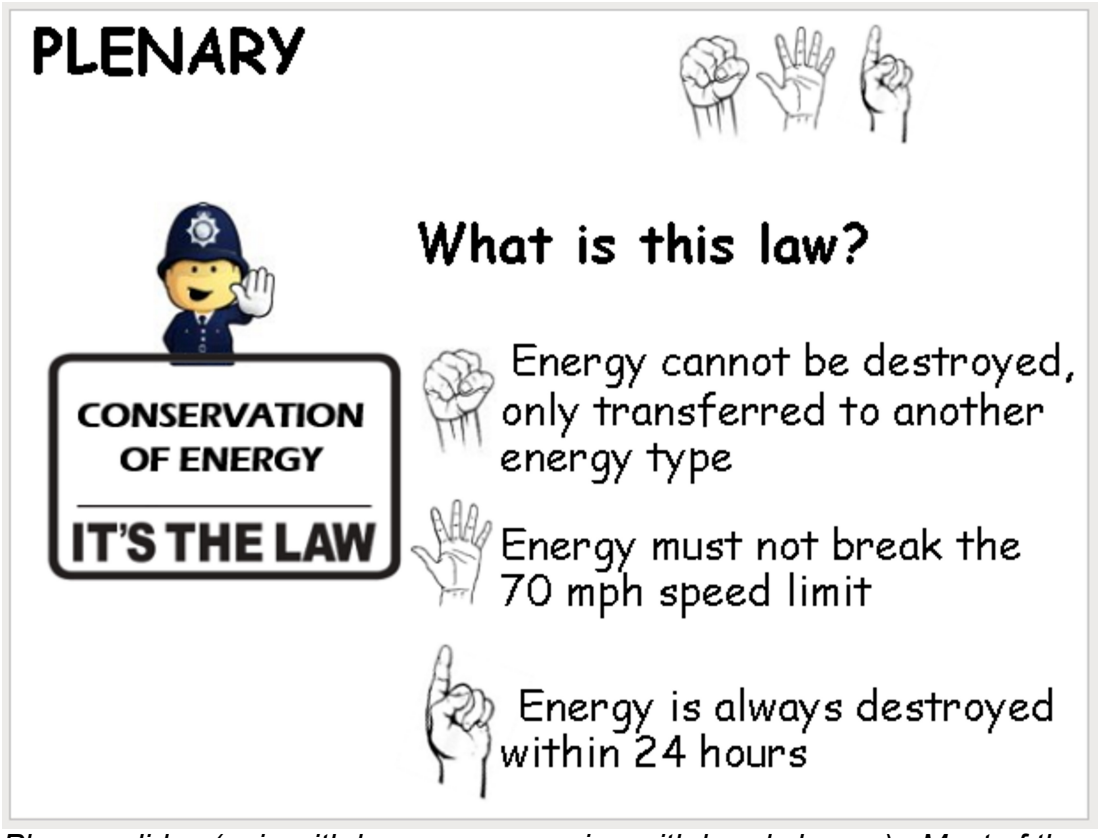


Slide for starter to the lesson - this is knowledge that the learners should be able to recall from previous lessons (answers only revealed after the learners had completed the task).



Two stations set up ready for the energy circus





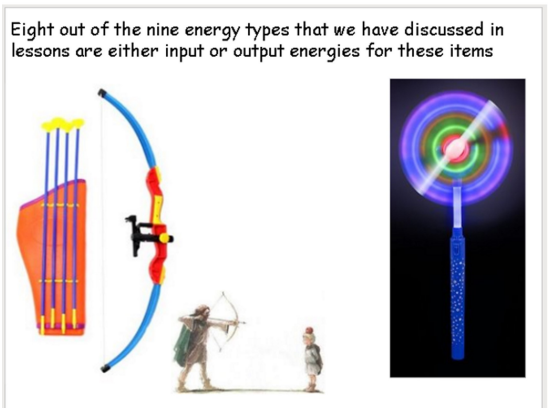
Plenary slides (quiz with learners answering with hand shapes). Most of the quiz questions focussed on the topic covered in the lesson but the final question (conservation of energy) was covered 2 weeks before this lesson. Almost all of the learners got the answer correct. Whilst the other possible answers were not very realistic it is still useful to repeat key information like the law of conservation of energy.

November-December 2019 - various classes

Recall of previous knowledge

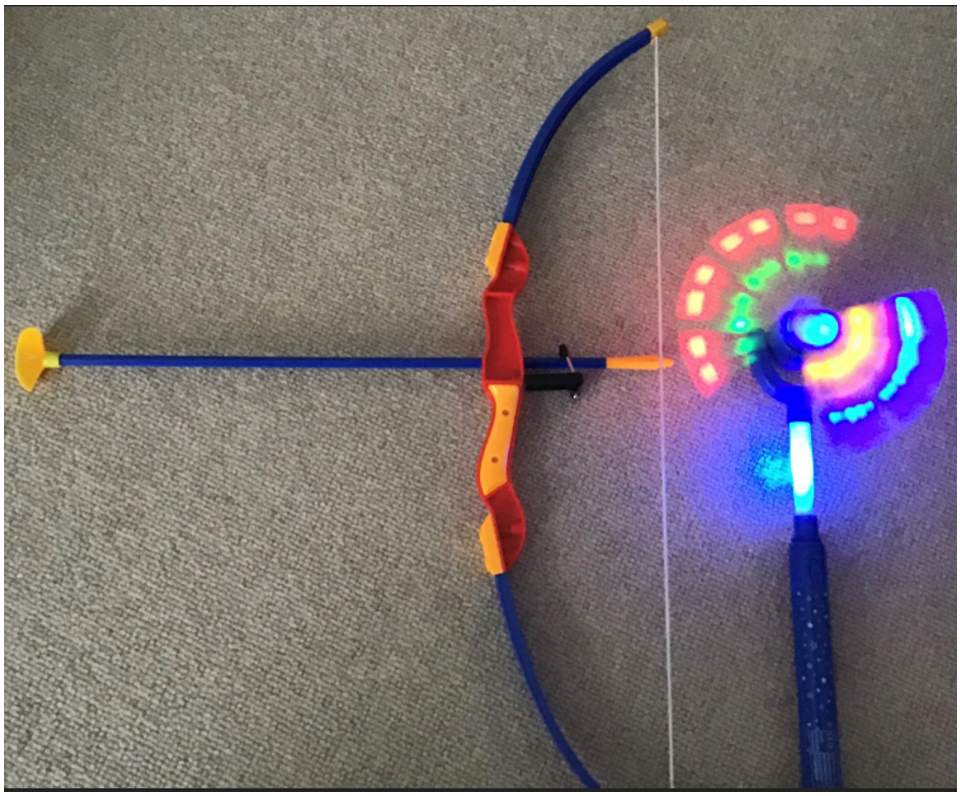
Throughout Block 1 of PTE1 I have tried to use starters and "Do Now" tasks to focus on recall of previous knowledge. This focus on previous knowledge at the start of lessons is beneficial for two reasons:

- Practicing recall helps learners to retain information in their long term memory bank.
- Many lessons on a topic build upon what was learned previously. By reminding learners of what was covered in previous lessons, even those learners that may have forgotten something, can start the lesson with the required knowledge re-introduced.

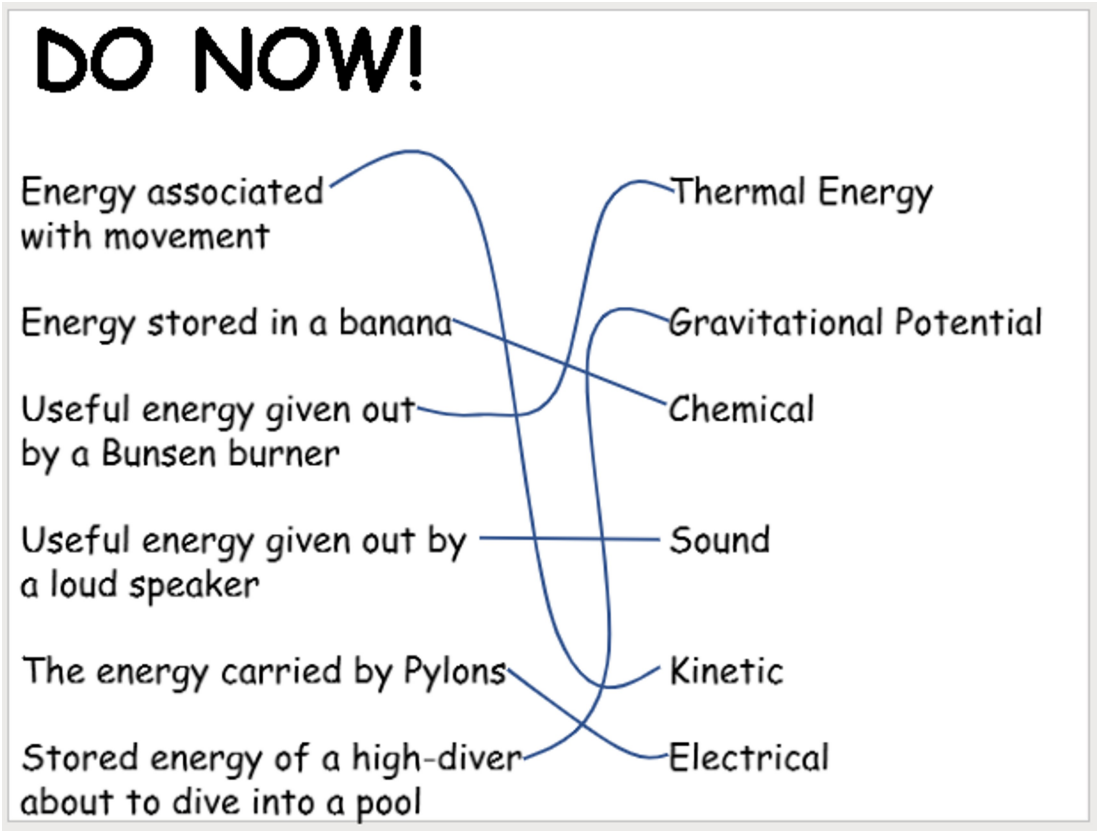


Year 7 Starter re-visiting energy type transfers before a lesson focussed on writing a report on energy types.

For this starter I brought into the class a bow and arrow and swivel spinner which allowed demonstration of 8 out of the 9 energy types. I used volunteers to demonstrate the items which resulted in a lot of engagement and excitement!



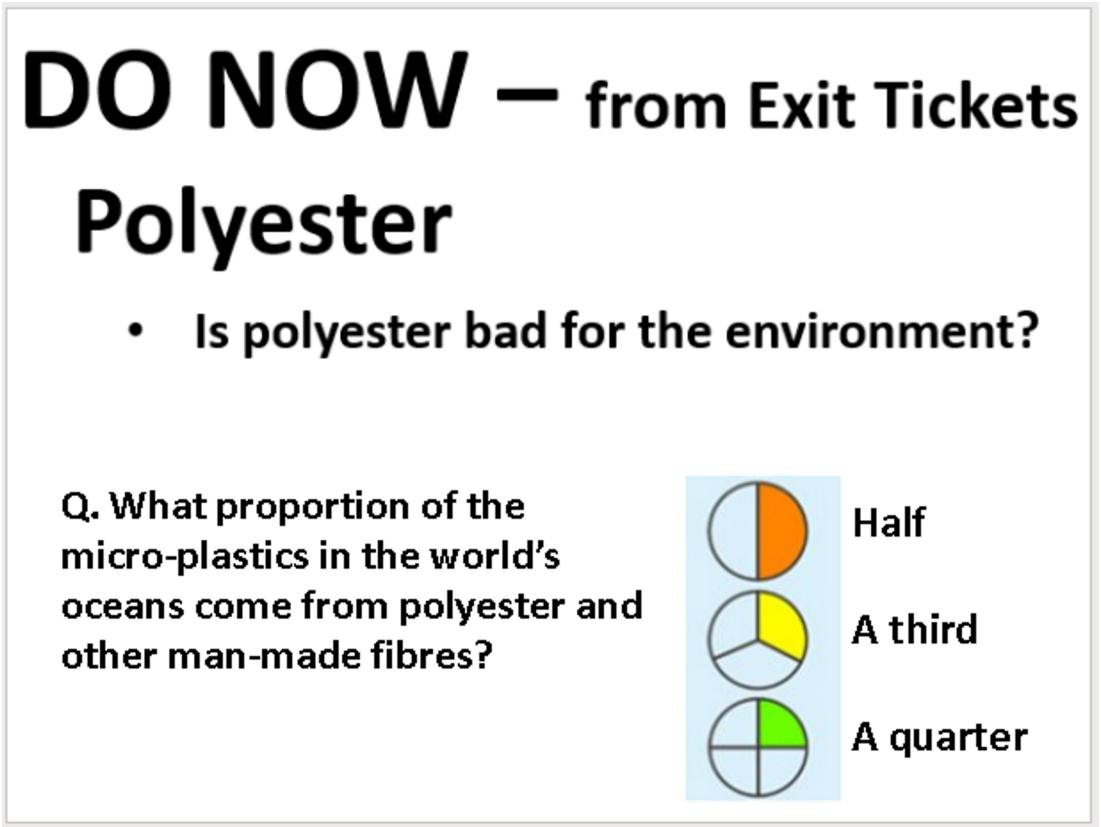
Engaging Interest. Props for the pupil demonstration of 8 out of 9 energy types (we couldn't get an example of nuclear energy into the lab!)



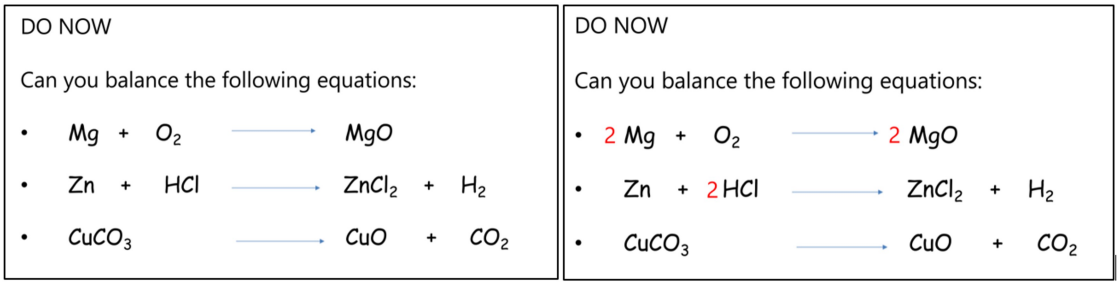
Year 7 Starter re-visiting energy types before a lesson completing a practical testing the efficiency of a Bunsen Burner



Year 8 Do Now task. Following a series of lessons focussed on displacement reactions and electrolysis (which is how coins get plated with exterior metal plating)



Year 9 Do Now task about polyester. This followed a lesson on fibres where the learners expressed interest on whether polyester was bad for the environment. Whilst not recall of previous knowledge, this Do Now was aimed at engaging interest. The answer to the question on the slide is one third.



Year 10 Do Now task on balancing equations. This was the topic covered the previous week and a question on this will almost certainly appear on the learners GCSE paper in the summer.

20 November - Year 10 (10DS3)

Recall of Previous Knowledge and **Engaging Interest**

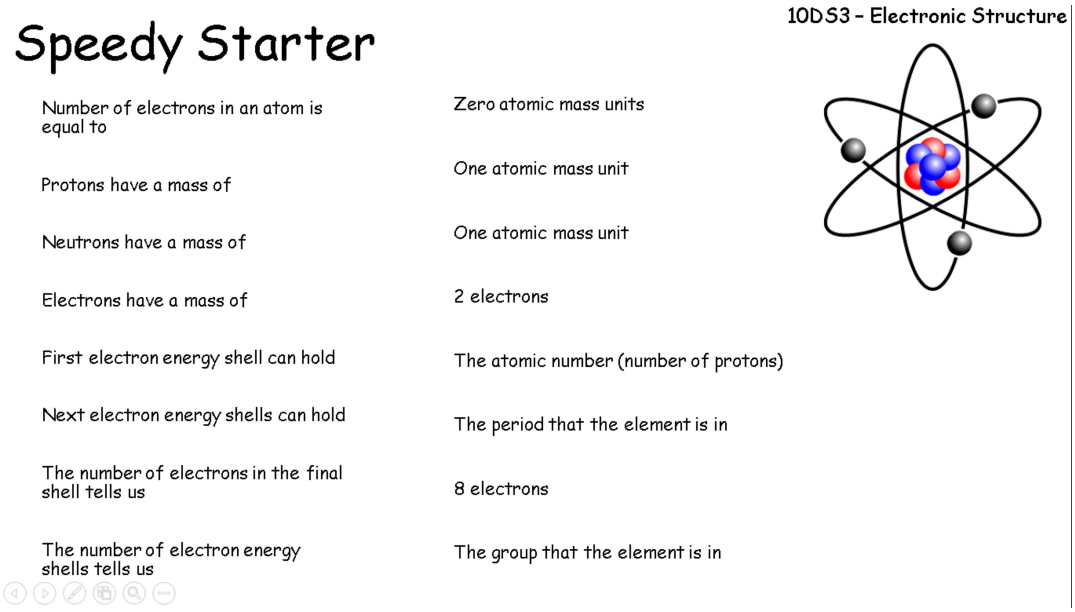
This lesson was focussed on balancing chemical equations. Balancing equation questions almost always appear on the GCSE Chemistry double science paper. Therefore, mastering this skill provides a real opportunity for these learners who are C/D borderline learners to progress towards a C grade in Unit 1 the summer.

The lesson started with a Do Now starter which focussed on recall of previous knowledge (the previous topic of electronic structure).

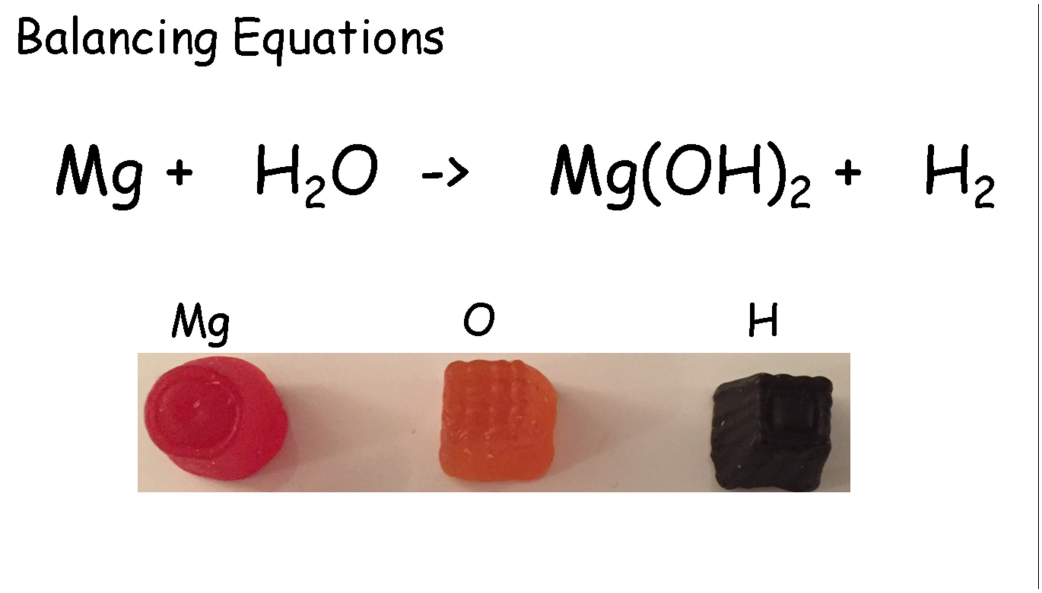
The main part of the lesson focussed on balancing chemical equations. Talking to the normal class teacher before this lesson we discussed how it was difficult to make this topic interesting for the class. This class has some behaviour and concentration issues so I tried to think of how I could make the lesson more engaging.

I decided to use sweets (and cereal) as tools to understand balancing equations. This seemed to work well and the class enjoyed doing something different and their concentration levels were slightly better thanks to this increased engagement. They also enjoyed eating some of the sweets which wasn't planned!

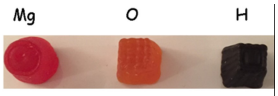
The plenary mostly focussed on quiz questions about the topic covered in the lesson but the final question related to the previous topic. This was designed to test the learners recall of previous knowledge and to try and get this information into the long term memory banks. It also allowed me to assess whether the class are retaining this information or if I need to revisit the topic in future.



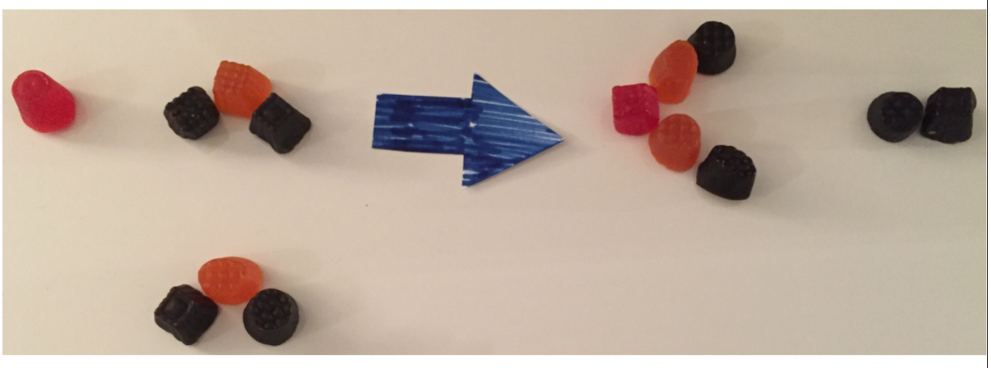
Starter testing recall of previous knowledge from previous lessons. Learners had a print out of the slide and had to join the left hand statement to the right hand answer.



Balancing Equations

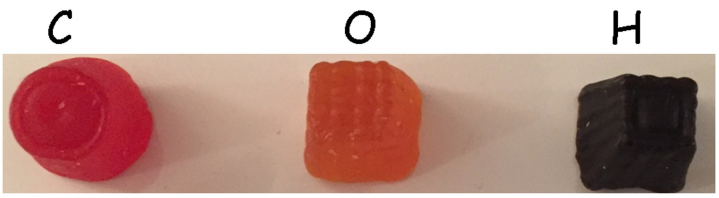


$$Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$$

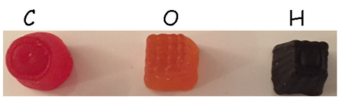


Balancing Equations

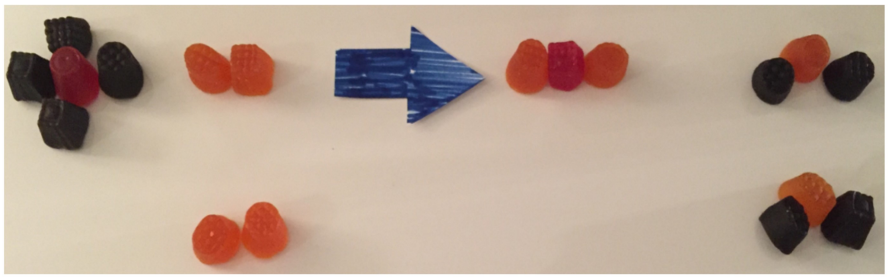
$$CH_4 + O_2 \rightarrow CO_2 + H_2O$$



Balancing Equations



$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$



Slides demonstrating how to use the sweets for balancing chemical equations.

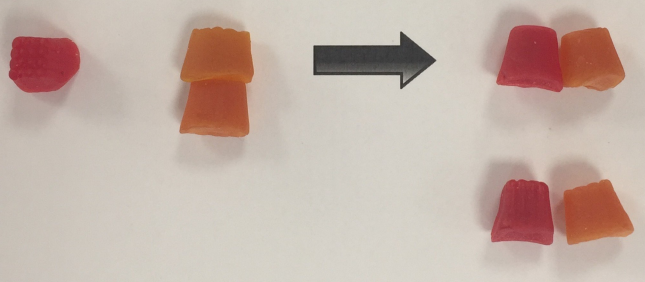
Balancing Equations - 10DS3 – Dydd Mercher 20 Tachwedd

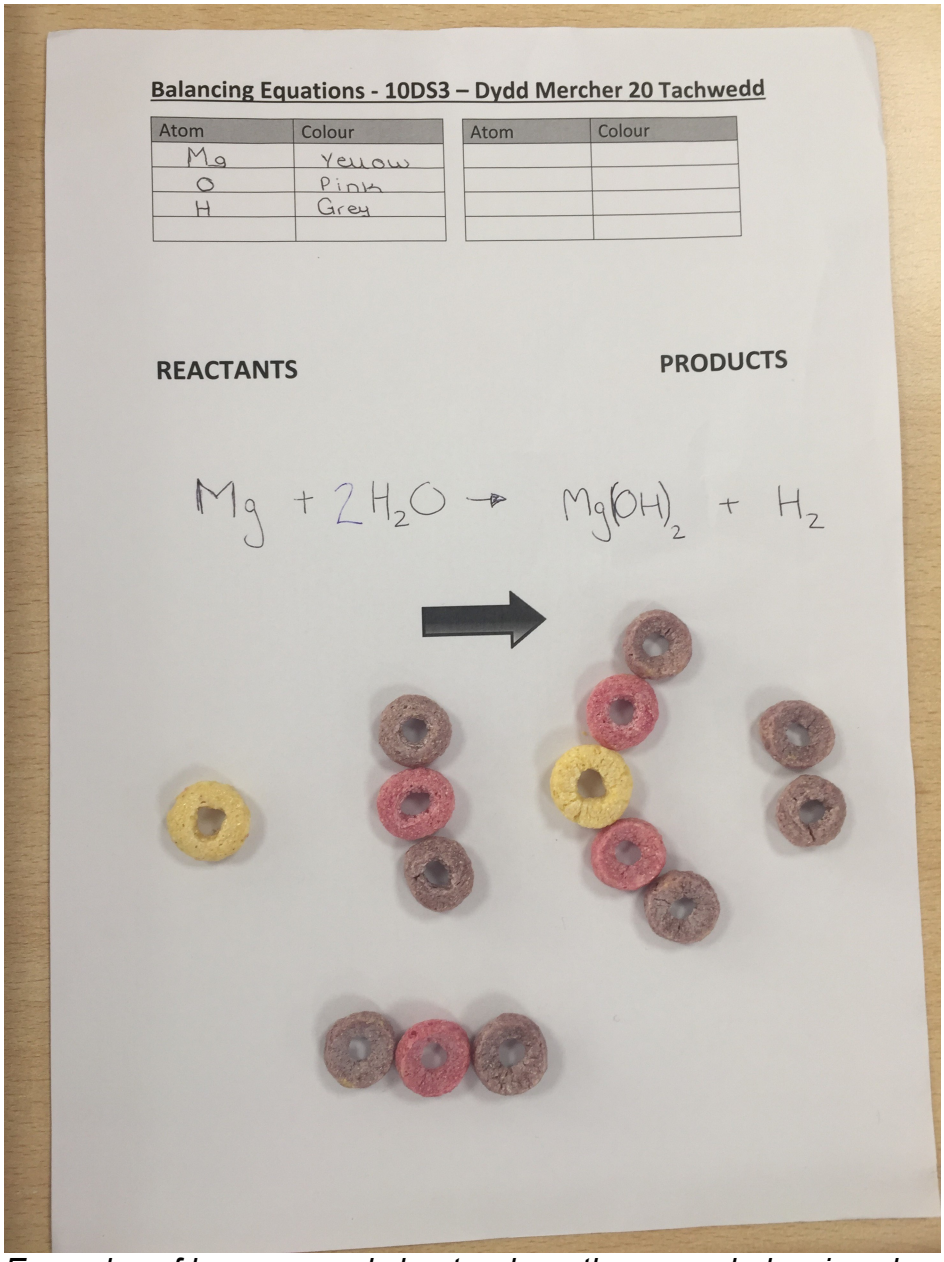
Atom	Colour
Mg	Red
O	Yellow
H	Black

Atom	Colour

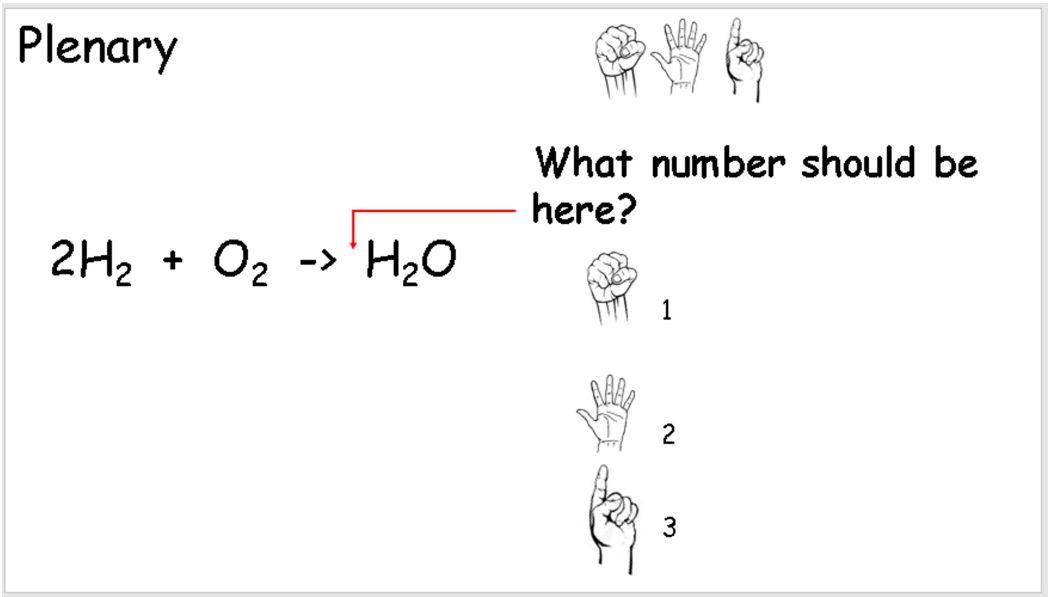
REACTANTS **PRODUCTS**

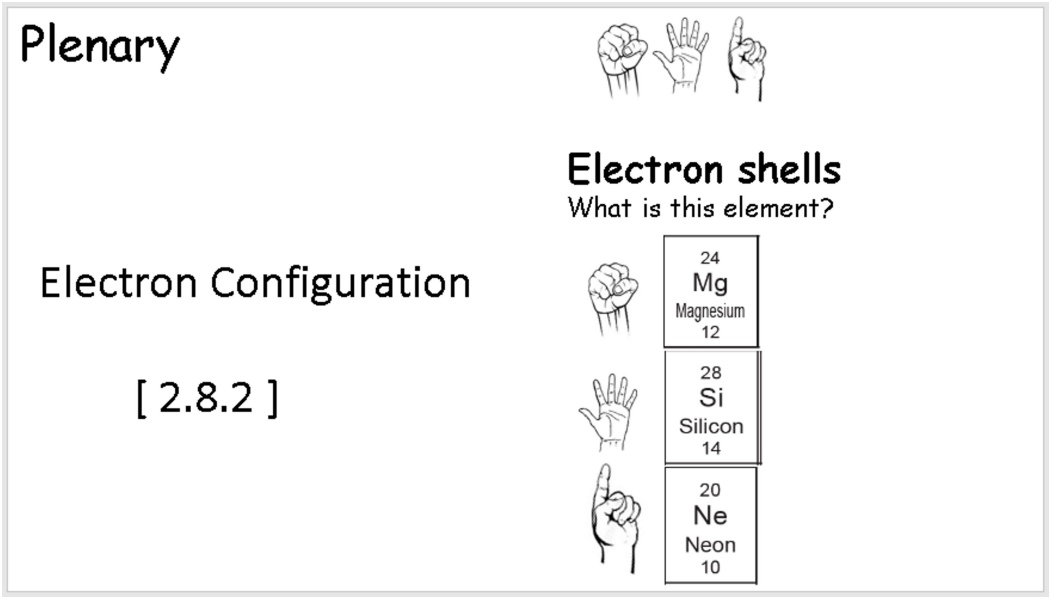
$2Mg + O_2 \longrightarrow 2MgO$





Examples of learners worksheets where they were balancing chemical equations using sweets (and cereal).





Plenary slides - most questions focussed on balancing equations but the final question (electronic configuration) returned to the previous topic to test how well the learners remembered these rules.

Critical Reflection

09 December 2019 09:17

A critical reflection on my progress in planning and implementing the pedagogical principles

WORD COUNT 3,016

Introduction

From 21st October – 6th December 2019, the University of Wales Trinity St David PGCE students have completed six weeks of their first Professional Teaching Experience (PTE1).

The author of this assignment is completing PTE1 at a large secondary school located in a city in South Wales. This is a mixed gender English medium school that provides key stage 3, 4 and 5 education with an age range of 11-19 years. In the most recent Estyn Report (Estyn, 2018) the school was judged to be Excellent in all five inspection areas.

In the period being studied the author has led teaching in key stage 3 and 4 science classes whilst also providing teaching assistance in key stage 5 chemistry lessons.

This assignment attempts to review the most pertinent academic literature and assess the author's progress to date on PTE1, paying particular attention to three of the twelve pedagogical principles which are set out in the Welsh Government Successful Futures report (Donaldson, 2015). The three principles being reviewed are:

- Employing assessment for learning principles.
- Regularly reinforcing cross-curriculum responsibilities, including literacy, numeracy and digital competence, and providing opportunities to practice them.
- Setting tasks and selecting resources that build on previous knowledge and experience and engage interest.

Annotated examples detailing the implementation of each of the three pedagogical principles are shown within the OneNote documentation that accompanies this critical reflection.

Teaching and Learning – Literature and Progress Review

Defining good teaching learning is not an exact science. Over the last 100 years a number of educational theories have developed such as behaviourism and constructivism. Behaviourists define learning as a how people respond to external stimuli (Elliot, 2007), whereas constructivists consider learning to be active mental work rather than passively receiving information (Woolfolk, 2016).

In the last 20 years, a greater focus in educational research has been given to evidence-based approaches to teaching and learning. Hattie (2009) analysed over 800 studies relating to educational achievement and identified effect sizes for different teaching approaches. Using this analysis Hattie proposed that, in order to improve learning, teachers need to focus attention on the

impact that they have on learning, and to use this information to refine their approach. Similarly, the study completed by Coe et al (2014) showed that the strongest evidence for improved outcomes was teacher content and pedagogical knowledge, in particular being able to evaluate how well learners' understanding was developing.

It appears that the twelve pedagogical principles detailed in Successful Futures (Donaldson, 2015) align well with the academic literature in terms of the approaches that yield the best results, and this bodes well for the new curriculum in Wales.

Employing assessment for learning principles. – Literature Review

The terms assessment for learning (AfL) and formative assessment are generally used interchangeably in the academic literature. In this assignment the acronym AfL will be used.

Traditionally assessment was considered to be the end product of teaching and learning, resulting in a pass or fail for the learner (summative assessment). However, AfL is focussed on the learning process and attempts not to prove that learning has taken place but to improve the process of learning (CCEA, 2007).

Over the last 20 years, a significant volume of evidence has been collected, demonstrating that AfL can have a substantial effect on learning. A configurative review undertaken by Black and William (1998) alongside meta-analyses by Kingston and Nash (2011) appear to show that suitable use of AfL can improve learning. In addition, research that has examined the entire area of education have often found that key elements of the AfL approach, such as peer and teacher feedback, are individually strongly correlated to improved learning outcomes (Education Endowment Foundation, 2015). Bennett (2011) questioned whether the impact of AfL is as large as has been suggested elsewhere. However, this research was focussed primarily on the lack of consistency in terms of defining AfL and in measuring its impact. Bennett did concede that the general principles of AfL can enhance learning.

Fundamentally, AfL is about finding out where the learner is, in terms of what they already know, and then making it clear to the learner where they need to get to. Finally, and most importantly, the learner must be shown how to get from the current level of understanding to the required level (Welsh Government, 2010a). Classroom strategies for AfL can be grouped into three main areas:

- Teacher questioning / class discussion

  During teacher questioning and class discussion, it is critical that the dialogue results in learners undertaking thoughtful reflection (Black & Wiliam, 1998). For example, by increasing "wait-time" after posing a question, the teacher can signify to learners that the question requires deeper thinking (Ingram & Elliott, 2016).

- Teacher feedback to learners

  The most effective formative feedback for learners should by timely; identify successes; identify where and how improvement can occur; use accessible language for the learner; and provide time for the learner to act upon it (CCEA, 2007).

- Peer and Self-Assessment

  Peer and self-assessment can be valuable in helping learners to make progress. Self-assessment provides an opportunity for the learner to better understand the assessment criteria (ARG, 2006). Peer assessment can be highly effective because learners may more willingly accept criticism from their peers (Welsh Government, 2010b).

Critical Reflection of Progress During PTE1 (AfL)

The author of this assignment has used a number of AfL techniques as shown in the annotated OneNote examples.

Formal attempts to assess understanding have generally been completed as part of starter and plenary tasks. An example of assessing understanding during starters can be seen in OneNote showing the use of concept cartoons. As discussed in the OneNote annotations this approach provides learners with an opportunity to answer a question with the fear of failure greatly reduced (Naylor, 2000). Examples of assessment during plenaries are shown with the use of quiz cards and the Plickers application. Plickers has been the most useful tool in terms of properly assessing individual learner's understanding because it provides individual, accurate results, with restricted opportunities for learners to copy their peers. During the main body of the lesson the author has attempted to develop his questioning skills in order to try to continuously monitor understanding. Targets in the APLP weekly reviews have included attempting to use strategies such as *Accept Build Challenge, Think Pair Share* and *Pose, Pause, Pounce, Bounce*. This target has been completed, with positive results.

Learning Objectives have been regularly shared with classes at the start of lessons and these objectives are differentiated through the use of the terms:

- All of us…
- Most of us…
- Some of us…

Reflecting upon the lessons taught to date, whilst lesson objectives are regularly shared, in future the author needs to spend more time considering when in the lesson the objectives are shared. Generally, the lesson objectives have been shared near the start of the lesson but in some instances the objectives themselves may mean very little to the learners so early in the lesson.

The practice of assessing current levels of understanding alongside explicitly sharing the learning objective provides a good platform to begin to show learners ***how*** they will achieve the learning objective. In terms of the "how", classroom teacher feedback during PTE1 has shown that class "instructions" have improved, as evidenced in the OneNote annotated examples.

One area which has been identified where potential improvements could be made is to make better use of self-assessment and peer assessment strategies. This approach has not been utilised often and the author aims to increase its use in future.

Reinforcing Cross-Curriculum Responsibilities and Providing Opportunities to Practice them – Literature Review

Literacy, numeracy and digital competence can be considered as the foundations for almost all other learning. These skills are essential to being able to successfully participate in the modern world and are requirements for future employers (Donaldson, 2015). Pupils who have poor literacy and numeracy skills often under-achieve across the whole curriculum due to these shortcomings (Byrne and Brodie, 2011).

The new curriculum for Wales sets literacy, numeracy and digital competence as statutory responsibilities across the whole curriculum. All teachers will be required to plan for progress against the full range of literacy, numeracy and digital skills (Welsh Government 2019). The frameworks are broken down into "strands" as shown in table 1. Teachers can download the LNF and DCF as Microsoft Excel files and these provide comprehensive information detailing what learners at different stages should be achieving.

Framework Element	Strands
Literacy	Oracy Reading Writing
Numeracy	Developing numerical reasoning Using number skills Using measuring skills Using data skills
Digital Competence	Citizenship Interacting and collaborating Producing Data and Computational Thinking

Table 1 showing strands of the LNF & DCF. Constructed using the downloaded Microsoft Excel frameworks (Welsh Government,2019)

Whilst the academic literature is quite consistent in its acceptance that literacy, numeracy, and more recently, digital competence are important skills that require development, there remains some debate about whether a cross-curricular approach is always effective. For example Conley (2008) notes that literacy strategies provided to content area teachers often did not fit well with the content area goals. An approach to combat this issue is to focus on using reading and writing to learn content (Fisher and Ivey, 2005) albeit research on writing as a method for learning has mixed results (Bangert-Downs et al, 2004). However, whilst cross-curricular teaching may be imperfect, it remains the best identified method of raising standards in areas such as literacy, numeracy and digital competence (Draper, 2010)

The author of this assignment is a Science PGCE student so this section will focus on the potential opportunities to bring the LNF and DCF into science lessons. It is critical that any literacy, numeracy or digital competence element of a lesson is scientifically relevant and provides both development of the cross-curricular skill whilst also helping the learner to make progress in science.

Extended writing activities within science lessons can facilitate learners' thinking about science content, and also result in work that provides the teacher with evidence of current understanding levels in the class (Byrne and Brodie, 2011). Pupil research followed by presenting their findings back to the class can also provide an excellent route to incorporate oracy, reading and writing into science lessons. These activities can also engage learners interest and help embed scientific knowledge (Byrne and Brodie, 2011).

Science offers many opportunities to incorporate numeracy into lessons. Most science practical experiments that learners complete require numerical data to be captured through measurement and then this data is used to perform calculations in order to come to scientific conclusions. The variety of different practical and theoretical problems that can be tackled in science lessons should make incorporating numeracy a relatively simple task.

Opportunities to develop and apply digital skills within science lessons are numerous. One example is the use of multimedia simulations. These can offer dynamic and visual representations of experiments and physical phenomena which would be too expensive or dangerous to complete in a school laboratory. For example the University of Colorado provides an online simulation where the user can complete nuclear fusion reactions (PhET, 2019). Other opportunities include computer data analysis using data from practical experiments and producing presentations.

<u>Critical Reflection of Progress During PTE1 (Cross-Curricular Responsibilities)</u>

During PTE1 the author has attempted to incorporate literacy, numeracy and digital competence into lessons.

Within the lesson plan documentation, literacy has been regularly mentioned within the *cross-curricular responsibilities* section. The annotated example of the creation of an energy report demonstrates an opportunity to incorporate literacy into science lessons whilst also aiming to embed scientific learning to long term memory. The author recognises that the literacy element of cross-curricular responsibilities to date has focussed disproportionately on writing skills and not sufficiently tackled oracy and reading. In the future, increased focus will be placed on oracy and reading.

As a science PGCE student, there are multiple opportunities to incorporate numeracy into lessons. The annotated examples showing calculations of microscope magnification and the Bunsen burner efficiency practical allowed learners to develop measuring (thermometer), data (results) and number skills (calculations). In addition, the Year 7 "numeracy rich" assessed task was entirely focussed on numeracy skills. The learners found the task of extracting relevant information from text and tables in this task very difficult. Whilst the mathematics was quite simple the majority of the class struggled to identify what they actually needed to do. In the future the author will try to incorporate these kinds of problems into lessons to develop this skill in the learners.

Digital competence skills have been incorporated into lessons for all classes taught. However, these have been limited to 1-2 lessons per class. These include the OneNote annotated Year 7 example of the energy report; a Year 8 reactivity series infographic task and a Year 9 presentation on the atmosphere. To date, the author has simply quoted the use of laptops in the

lesson plan to demonstrate the DCF cross-curricular responsibility. However, the DCF includes specific elements within it that should be met. For example, in each of the tasks mentioned above, internet research was required. Within the DCF there is a section that details what is expected from key stage 3 learners when completing online research in terms of using a variety of sources, organising searches and referencing (Welsh Government, 2019). In the future, the author will endeavour to meet and detail individual elements of the DCF requirements within lesson plans.

Setting tasks and using resources that build on previous knowledge and experience and engage interest – Literature Review

If learners possess and access previous knowledge about a particular topic, this can improve how well they remember new information on that topic (Pressley & Hilden, 2006). This improvement in learning is caused by being better able to store new information alongside known information, and also being able to better identify what information is important (Kostons and Werf, 2015). However, prior knowledge will not appear in the learner's working memory, and therefore not be of any use, unless it is first activated (Mayer, 1979). It is also important to ensure that any prior knowledge that the learner accesses is accurate. Dinsmore and Parkinson (2013) showed that learners can activate previous knowledge that is incorrect and then remain unaware that their previous knowledge is flawed.

The other benefit of activating previous knowledge is that it helps to embed knowledge into the long-term memory. The forgetting curve, first hypothesised by Herman Ebbinghaus in 1885, shows that information is lost from memory over time if it is not actively and regularly brought back into working memory. Contemporary work by Murre and Dros (2015) has shown that regular recall of existing knowledge is the only way to embed knowledge into long term memory.

It seems logical that engaging interest in learners would result in improved concentration and better learner performance. However, a number of studies (Soderstrom and Bjork, 2013; Coe 2013) have shown that it is possible for learners to be deeply engaged in a task without demonstrating subsequent improved capability. However, if a class is entirely disengaged, then the opportunity for progress is clearly limited. Therefore, whilst engaging learner interest may facilitate learning, engagement should not be the single focus when planning lessons.

Critical Reflection of Progress During PTE1 (Building on Previous Knowledge and Engaging Interest)

The author has tried to make sure that previous knowledge is being activated at the start of the lesson by setting starter activities that relate to work previously completed.

Whilst it is not possible to show all the starter activities completed to date within the OneNote annotated examples, the author has reviewed all lessons completed. The majority (circa 75 %) of starters focus on previous knowledge and this approach has now become habit for planning lessons.

The author has tried a number of different techniques to try and engage learners interest. The examples within the annotated OneNote examples such as the energy circus, bow and arrow and swivel spinner demonstration, balancing sweet equations and polyester pollution demonstrate some of the attempts that have been made. From a basic job satisfaction perspective, the

author has found that it is much more enjoyable to plan and deliver lessons that engage learner interest instead of simply running through the standard scheme of work. In addition, whilst engagement in itself does not guarantee improved learning outcomes (Soderstrom and Bjork, 2013; Coe 2013), there is little doubt that increased levels of engagement can facilitate learning, provided that other sound pedagogical approaches are being used.

Recommendations

The first teaching placement provides a steep learning curve for student teachers. As part of this assignment, I have reviewed the lessons delivered over the six-week period and I believe that there is evidence of improvement. That being said, there remains a lot to learn in the second block of PTE1, PTE2 and into a career in teaching. The recommendations provided here will form part of the targets agreed with my mentor for the second half of PTE1:

1. Consider when lesson objectives should be shared with the class. Whilst in general, sharing the objectives early in the lesson makes good sense. It is important to make sure that the learners have sufficient knowledge of the topic to understand what the objectives means.

2. Aim to increase the use of self-assessment and peer-assessment strategies in lessons.

3. Incorporate more numeracy problems into lessons which require the learners to extract information from a variety of sources (text, tables, charts).

4. Expand the focus on literacy to include oracy and reading and clearly flag this in lesson plans.

5. Focus on the detailed cross-curriculum requirements for the relevant progression step that are published in the LNF and DCF (Welsh Government, 2019) and explicitly identify the requirement being met in lesson plans.

This assignment has provided an opportunity for me to holistically review my progress to date during PTE1. This has proved invaluable and has helped me to recognise the progress that has been made in the first 6 weeks of teaching experience. It has also identified a number of areas where there are opportunities for me to improve which I am looking forward to tackling when I return to school in January.

References

14 October 2019 19:17

Assessment Reform Group (2006) 'The role of teachers in assessment of learning' London: Institute of Education.

Bangert-Downs, R. L., Hurley, M. M. & Wilkinson, B. (2004). 'The effects of school-based writing-to-learn interventions on academic achievement: A meta-analysis' *Review of Educational Research* Vol 74(1), pp. 29-58.

Black, P., & Wiliam, D. (1998). 'Assessment and classroom learning'. *Assessment in Education: Principles, Policy and Practice,* Vol 5(1), pp. 7–75.

CCEA (2007) *Assessment for Learning for Key Stage 3* Belfast: PMB Publication.

Coe, R., Aloisi, C., Higgins, S. & Major, L.E. (2014) 'What makes great teaching? Review of the underpinning research.', *Project Report*. London: Sutton Trust.

Conley, M. (2008). 'Cognitive strategy instructions for adolescents: what we know about the promise, what we don't know about the potential' *Harvard Educational Review,* Vol 78(1), pp. 84-106.

Dinsmore, D. L. & Parkinson, M. M. (2013) 'What are the confidence judgements made of? Students explanations for their confidence ratings and what that means for calibration' *Learning and Instruction* Vol 24, pp.4-14

Donaldson, G. (2015). *Successful Futures: Independent review of curriculum and assessment arrangements in Wales*. Cardiff: Welsh Government.

Draper, R. J., & Siebert, D. (2004). 'Different goals, similar practices: Making sense of the mathematics and literacy instruction in a standards-based mathematics classroom' *America Educational Research Journal,* Vol 41(4), pp. 927-962.

Education Endowment Foundation. (2015). 'Teaching and learning toolkit' at https://educationendowmentfoundation.org.uk/toolkit/toolkit-a-z/ (Accessed: 27 December 2019)

Elliot, P. (2007) 'Communication in the Classroom' *Brooks, V. And Abbot, I. And Bills, L. (Eds.) Preparing to Teach in Secondary schools* Berkshire: McGraw Hill.

Estyn (2018) *A Report on* [redacted]. *Date of Inspection: February 2018* Available at https://www.estyn.gov.wales/sites/www.estyn.gov.wales/files/documents/[redacted] (Accessed 20th December 2019).

Fisher, D. & Ivey, G. (2005). 'Literacy and language as learning in content-area classes: A departure from "every teacher being a teacher of reading."' *Action in Teacher Education,* Vol 277(2), pp. 3-11.

Hattie, J. (2009) Visible Learning: A synthesis of over 800 meta-analyses relating to achievement. New York: Routledge.

Ingram, J/ & Elliott, V. (2016) 'A critical analysis of the role of wait time in classroom interactions and the effects on student and teacher interactional behaviours' *Cambridge Journal of Education* Vol 46(1), pp. 37-53.

Kingston, N. M. & Nash, B. (2011). 'Formative Assessment: A Meta-Analysis and a Call

for Research' *Educational Measurement: Issues and Practice,* Vol 34(1), pp. 28-37.

Kostons, D. & Werf, G. (2015) 'The effects of activating prior topic and metacognitive knowledge on text comprehension scores' British Journal of Educational Psychology Vol 85(3), pp. 264-275

Mayer, R. E. (1979). Twenty years of research on advanced organizers: Assimilation theory is still the best predictor of results. *Instructional Science* Vol 8, pp. 133–167.

Murre J.M.J. & Dros J. (2015) 'Replication and Analysis of Ebbinghaus Forgetting Curve'. *PLOS ONE* Vol10 (7).

Naylor, S. & Keogh, B. (2000) *Concept Cartoons in Science Education* Stafford: Millgate House.

PhET (2019) 'Nuclear Fission Simulation' at https://phet.colorado.edu/en/simulation/legacy/ nuclear-fission (Accessed: 30 December 2019).

Pressley, M., & Hilden, K. R. (2006). 'Cognitive strategies: Production deficiencies and successful strategy instruction everywhere' *D. Kuhn & R. Siegler (Eds.), Handbook of child psychology, Vol. 2: Cognition, perception, and language* (6th ed.), pp. 511–556. New Jersey: Wiley.

Welsh Government (2010a) *Why develop thinking and assessment for learning in the classroom?* Cardiff: Welsh Government.

Welsh Government (2010b) *How to develop thinking and assessment for learning in the classroom?* Cardiff: Welsh Government.

Welsh Government (2014) 'Training Pack to support implementation of the National Literacy and Numeracy Framework' at https://hwb.gov.wales/curriculum-for-wales-2008/national-literacy-and-numeracy-framework-curriculum-for-wales-2008-version/training-pack-to-support-implementation-of-the-national-literacy-and-numeracy-framework/ (Accessed: 27 December 2019).

Welsh Government (2019) 'Draft curriculum for Wales 2022' at https://hwb.gov.wales/draft-curriculum-for-wales-2022/ (Accessed: 27 December 2019).

Woolfolk, A. E. (2016). *Educational Psychology*. Harlow: Pearson Education Ltd.