# Cheshire & Stockport SLP Newsletter – March 2018 (2)

Let me start this week by paying tribute to the fantastic work our technicians do. If you are active on twitter you may have seen the #TECHOGNITION campaign led by unison to highlight these unsung heroes and the work they do in keeping the Science department running. I know I wouldn't be where I am now, if it weren't for the fabulous technicians I have worked with in the different schools where I have been employed. More here http://techognition.org/ or just get onto twitter and search the hashtag to see so many inspirational pictures.

Tomorrow sees the start of British Science Week. However you are celebrating, I thought I would share this image which highlights some of the amazing life-saving work of scientists.

| Scientist | Discovery | Lives Saved |
|---|---|---|
| Abel Wolman (1892–1982) and Linn Enslow (1891–1957) | chlorination of water | 177 million |
| William Foege (1936– ) | smallpox eradication strategy | 131 million |
| Maurice Hilleman (1919–2005) | eight vaccines | 129 million |
| John Enders (1897–1985) | measles vaccine | 120 million |
| Howard Florey (1898–1968) | penicillin | 82 million |
| Gaston Ramon (1886–1963) | diphtheria and tetanus vaccines | 60 million |
| David Nalin (1941– ) | oral rehydration therapy | 54 million |
| Paul Ehrlich (1854–1915) | diphtheria and tetanus antitoxins | 42 million |
| Andreas Grüntzig (1939–1985) | angioplasty | 15 million |
| Grace Eldering (1900–1988) and Pearl Kendrick (1890–1980) | whooping cough vaccine | 14 million |
| Gertrude Elion (1918–1999) | rational drug design | 5 million |

The researchers who assembled these conservative estimates calculate that more than *five billion* lives have been saved (so far) by the hundred or so scientists they selected.[5] Of course hero stories don't do justice

Not planned anything yet? Don't worry; take a look at this competition

http://copperalliance.org.uk/news-and-media/press-releases/2018-copper-education-competition-launched

My students have entered (successfully) in the past and have come up with some really inspiring efforts. We set it as a homework for year 8, then got our Science Ambassadors (students) to select the posters we chose to submit.

Recently I have been reading The Sutton Trust report on What Makes Great Teaching

https://www.suttontrust.com/research-paper/great-teaching/

The following probably won't surprise you.

## KEY FINDINGS

The two factors with the strongest evidence of improving pupil attainment are:

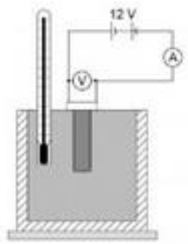
- teachers' content knowledge, including their ability to understand how students think about a subject and identify common misconceptions
- quality of instruction, which includes using strategies like effective questioning and the use of assessment

But it is worth thinking about how we identify and deal with misconceptions. Many of the SLP subject-knowledge courses offer strategies to address misconceptions and the STEM learning website has some useful resources too. These are really helpful when you want to write your own hinge point or diagnostic questions, which brings us to the second point; effective questioning.

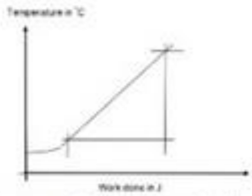
I know at this point the focus is on the forthcoming new GCSEs and students will be getting lots of question practice. Again my searching has uncovered this on twitter: A link to a plethora of physics questions and an application of the required practical.

https://www.dropbox.com/s/8su0udkge7s842m/Physics%20Practice%20Questions.docx?dl=0

## REQUIRED PRACTICAL 1 – DETERMINING SPECIFIC HEAT CAPACITY




149. The diagram shows the equipment that can be used to determine the specific heat capacity of a material. Identify each piece of equipment being used and describe its purpose.
150. How can the current and voltage be used to calculate the power?
151. How can the total energy transferred by the heating element be calculated?
152. What is the typical resolution of a thermometer?
153. A pipette is used to add a small amount of water into the hole where the thermometer sits. Explain why.
154. Why must the mass of the block be recorded?
155. The student measures the temperature before and after the block is heated. Explain why.
156. The student plots a graph of work done against temperature as shown in the diagram. How can this graph be used to determine the specific heat capacity of the material?



157. Describe how you calculate the gradient of a graph.
158. The graph is not linear at the beginning. Explain why.
159. Write a method for using this equipment to calculate the specific heat capacity of a material.
160. When this method is used the value calculated is often higher than the true value. Explain why.
161. A student calculates the specific heat capacity of aluminium to be 800J/kg°C. The real value is 913J/kg°C. She says that her work is not accurate. What does accuracy mean?



162. A student calculates the specific heat capacity of copper to be 470J/kg°C. The real value is 385J/kg°C. Calculate the percentage difference between the real and experimental value.
163. A student calculates the specific heat capacity of iron to be 650J/kg°C. The real value is 500J/kg°C. Calculate the percentage difference between the real and experimental value.
164. A student calculates the specific heat capacity of aluminium to be 1000J/kg°C. The real value is 913 J/kg°C. Calculate the percentage difference between the real and experimental value.
165. A student calculates the specific heat capacity of lead to be 220/kg°C. The real value is 126J/kg°C. Calculate the percentage difference between the real and experimental value.
166. A student calculates the specific heat capacity of steel to be 470J/kg°C. The real value is 452J/kg°C. Calculate the percentage difference between the real and experimental value.
167. A student calculates the specific heat capacity of brass to be 280J/kg°C. The real value is 380J/kg°C. Calculate the percentage difference between the real and experimental value.

Another interesting article discusses the origin of science root words

https://sites.google.com/a/hartdistrict.org/mrlamarr-stem/CSCS-Activities/general-science/root-words-scientific-vocabulary

I'd completely forgotten the term *POIKILOTHERM* - an organism that cannot regulate its body temperature except by behavioural means such as basking or burrowing. That took me back to my Zoology A-level!