

Framework Biology 1

An Inquiry Based Science Teaching and Learning Framework

Discover
SENSORS

Topic/Learning Activity

Investigating the conversion of chemical energy in food to heat energy. OB5

Student Cohort

Student Level

First Years

Prior Knowledge

Measurement of temperature, mass, volume and units of same
Difference between heat and temperature
Energy

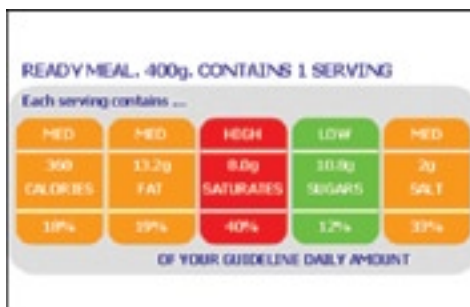
Stimulus to Engage

How do you get the students interested in the topic to start?
Show some pictures of animals and people eating, such as those shown below.
Also refer to food labelling.



Science Questions

- In the pictures the animals and the baby are eating food. Why do we need food?
- Do different types of food provide the same amount of energy?
- Where does this energy go when it enters our body?



Framework Biology 1

An Inquiry Based Science Teaching and Learning Framework

Discover
SENSORS

Learning Outcomes

Content Knowledge

The student will be able to:

- Demonstrate that food contains energy
- Describe how to compare the energy content of different foods
- Interpret food product labels (all labels should use the same unit of energy, i.e. either Joules or calories)
- Identify the variables which would influence the results of the activity

Process/Skills

The student will be able to:

- Organise themselves in their groups
- Decide what food to test and how much to use
- Read temperature using an alcohol thermometer and a temperature sensor
- Measure the volume of a liquid and the mass of food
- Calculate the rise in temperature

Suitable foods could be *crisps, skips, quavers, crackers, etc.*

Apparatus required: *retort stand, boiling tube, graduated cylinder, electronic balance, Bunsen burner, tongs, thermometer, temperature probe, datalogger*

Questions during Activity

Questions to drive student learning (directing them to the learning outcomes):

- In our initial discussion we said that food produces energy. Some of that energy is in the form of heat. Do you think that all food gives you the same amount of heat?
- Using a flame to burn the food, a container of water and a thermometer, could you design an activity to see how much heat is in a crisp or a cracker?

Questions to probe understanding:

- What do you predict will happen to the temperature of the water?
- (Students then carry out activity on a crisp and rise in temperature from each group is recorded on the board)
- Why was the rise in temperature different for each group?
- If you want to compare the energy given out by two different foods, what parts of the activity must be the same in each case to get reliable results?
- (Students then repeat activity with a definite volume of water and a constant mass of food)

Questions to get students thinking about their own learning (metacognition):

- Did you find that the first attempt at the activity helped you to identify ways to make the results more accurate?



Developing the Activity

How do you stimulate students to ask even more questions/think further?

- Get students to bring in food product labels and explain how to read them
- Hold up a bar of chocolate and a bag of porridge. Call out the energy content in each food. Chocolate has lots of energy but porridge keeps you full for longer. Why?
- Get students to look up glycaemic index on the internet and to divide their food product labels into two groups, based on whether they are low or high g.i. foods

Possible supporting activities:

- Use a temperature sensor to produce a temperature versus time graph for different foods. This not only shows the production of heat, but also indicates if the temperature rise is gradual or rapid for each food

Questions for supporting activities:

- Which food might be best to keep you full for a long time?
- Which food would be best to give you a sudden boost of energy?

Reflecting back to Learning Outcomes

- How many of your intended outcomes were achieved?
- Do any of your intended outcomes need to be revised?

Additional Resources

Stimulus materials, websites, etc.:

Food product wrappers

Google or other search engine to look up glycaemic index

www.juniorscience.ie

How has the use of ICT enhanced the learning?

Evidence of enhancement:

Sensor allows students to look at how fast the heat is produced.

Thermometer method really only shows the temperature before and after.

Older students could look at the slopes of the graphs when comparing foods.

Additional Comments

The students may need to be prompted a bit in order to devise the method for the activity. However, it's still worth getting them into groups to come up with some ideas as it gets the students thinking about the activity.

