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Teaching Ideas and Evidence through 'Light' in Year 8

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The Project

This research is based on an extension activity carried out with four high attaining pupils who were taken out from the normal class lessons for two, hour-long periods to challenge and extend their ideas about light through a practical activity. This practical activity was designed to extend the pupils and give them more autonomy by allowing them to design, carry out, and develop an appropriate practical way of comparing different strengths of drinks using colorimetric analysis. The activity allows pupils to extend their thinking beyond the QCA scheme of work, and allows them to apply and further the knowledge they should have acquired in lessons.

The project was carried out during the teaching of the topic of light, at the end of the unit on light and sound. The group consisted of the four most able pupils in the mixed-ability form group. The group was removed from the class for an hour-long period to elicit prior understanding on the topic of light and colour. This involved a questionnaire and group discussion. The group then carried out a challenging investigation involving colorimetric analysis and datalogging.

The following brief was given to the students (see pupil activity sheet 1 for full brief and student worksheets):

You are scientists from an independent consumer watchdog and have been asked to investigate the different orange-flavoured drinks supplied in each fast-food chain.

It has been reported that some fast-food chains have been 'cheating' their customers by making their blackcurrant squash too weak. You have to carry out an investigation and write a report to let the public know who sells the best squash (in terms of concentration).

A group discussion took place to decide the best way to approach the task. Initially, the pupils suggested visual comparisons of colour. When questioned further, they realised that this was not a very accurate method of comparison. When told about the datalogger, they decided to use this method to compare the drinks. The experiment was carried out over two, hour-long lessons, with pupils carrying out all stages of planning and execution, adjusting the method as they felt necessary, without teacher intervention.

Outcomes:

Discussion with pupils about the task revealed that pupils enjoyed the opportunity to work at their own pace rather than that of the rest of the class. They also enjoyed the special status of being chosen for this activity, and were pleased with the opportunity to use the computer to produce graphs and collect data.

In terms of my own professional development, participation in this project allowed me to focus in on a group of more able pupils and learn more about strategies to extend gifted and talented students.

Conclusions

I found that there were many benefits of this kind of extension activity and these included:

1. Extending and challenging the more able in the class;
2. Consolidating learning about concepts in the topic of light;
3. Developing thinking and investigative skills;
4. Encouraging pupils to apply theoretical knowledge to a practical task;
5. Drawing together information from across the entire topic;
6. Gives pupils more autonomy and ownership of their own learning.

Practicalities of the activity

Once the initial brief, knowledge and instruction for the use of the datalogger had been given, the group worked independently and this meant that it could be carried out alongside a whole-class activity. It also meant that ICT facilities (such as a datalogger) could be used by pupils, whereas this would be possible or practical for a whole-class experiment

Which fast food restaurant is 'cheating' their customers on the drinks?

Pizza Parlour

Burgers-R-us

FOOD TO GO

Lickin' Chicken

You are two scientists from an independent consumer watchdog, and have been asked to investigate the different orange-flavoured drinks supplied in each fast-food chain.

It has been reported that some fast-food chains have been 'cheating' their customers by making their orange squash too weak. You have to carry out an investigation and write a report to let the public know who sells the best squash (in terms of concentration).

Planning

Think about how you will investigate this and write your ideas below. Think about colour and light that can be measured in a scientific way (not about taste because this depends on the person doing the tasting!).

Now fill in your equipment request below, and the safety considerations and method to apply to carry out your investigation.

Equipment request:

Diagram of Apparatus:

Safety Considerations:

Method: (step-by-step and clear for the report)

Prediction:

What do you think will happen to the light reading if the squash is stronger? Why?

Results (fill in the units and what you are going to measure)

Restaurant			
Pizza Parlour			
Burgers-R-us			
FOOD TO GO			
Lickin' Chicken			

Results: Now draw (or print out a copy of) a graph of your results.

Conclusions:

Was your prediction correct? Which restaurant is cheating its customers on the squash? Which gives the best value for money squash? What did you find the concentrations of the squashes to be? Did the different squashes absorb different amounts of light? Why do you think this is? Was your experiment a fair test? What improvements could you make if you carried the experiment out again?