Teaching Resource :

Top tips for your investigations

2. TESTING HUMANS

Guidance for Teachers...

"Testing Humans" is one of **four interactive resources** designed to explain some of the simple strategies employed by real scientists when conducting investigations centred on human attitudes, skills and abilities. They represent good scientific habits which primary school children are able to learn. Exploring these will enhance critical thinking skills and give a major boost to your ESB Science Blast Investigations. Each resource can be used independently of each other. It's important to select the resources that are relevant to the investigation that you have in mind, and ideally they would be introduced to your class at an early stage of the planning process.

Each resource consists of two parts:

1. **An animated video** that explains through example. Each video contains points where it should be paused to allow for class discussion and problem solving.
2. **A small group discussion exercise**. Learning is reinforced by challenging students to apply the new strategies in different contexts. Descriptions and questions are summarized on our ready to print discussion cards.

The "Testing Humans" resource introduces **three tips** for conducting tests on human behaviour/abilities. We've called these strategies:

"Keep it SIMPLE !"

"BLIND testing"

"Easier when REPEATED!"

The thinking behind these strategies.

1. **"Keep it Simple":** This tip tries to bring attention to the fact that complicated science investigations don't always produce the best results. When it comes to designing science experiments one of the toughest challenges is making sure that your measurements and observations help you to **answer the question** you are asking and that **other factors** do not get in the way of this. This piece of advice applies to all kinds of science experiments but is particularly important when human behaviour or abilities are the subject of your curiosity. Observations can become very problematic if tasks or tests are too complex. Human factors like getting bored, or not wanting to appear silly can complicate getting accurate responses. So we encourage the idea that simplicity is a good and necessary thing in science investigations.

2. **"Blind Testing":** When investigating humans scientists always need to consider what impact our feelings and pre-existing attitudes might have on the outcome of an investigation. Humans are highly subjective and what we think or believe can greatly influence how we respond to tests and questionnaires. This is a great opportunity to introduce how problematic this can be for some science experiments. This tip encourages your students to carefully consider if any of the information they intend on give out could interfere with the experiments or tests they have designed. This issue is also visited in the "**Fair Testing & Control Experiments**" resource.

2. TESTING HUMANS

Guidance for Teachers cont...

3 **"Easier when repeated":** Lots of science investigations involve creating a '**fair test**'. This usually means making an observation or measurement in a controlled set of circumstances. Then introducing just **one change** and **repeating the task or the experiment** to see if there is any difference in the outcome. When investigating humans this standard approach can introduce a few problems, especially when the task or exercise being repeated involves mental or physical dexterity. These tasks are often easier for humans when you repeat them and this can interfere with getting realiable results. By making your class aware of this issue they can employ some simple strategies that should reduce the impact of this, but it is hard to completely eliminate it. Even if it cannot be fully avoided it is good to be aware of this challenge when reflecting on the outcome of your investigation.

Using the Animated Video:

The video is designed to explain the three strategies in an engaging way, using obvious examples.

There **are three pause points** in the 'Testing Humans' video for you to open up discussion and challenge students to come up with their own solutions before the video explains further.

It is important to emphasise that the aim is to engage students and encourage critical thinking. It is not important that they only come up with the "correct" solution. They may actually come up with some other strategies that could also help in this particular situation. Encourage that kind of thinking.

Lauren over complicates her 'taste test' and learns that sometimes (when it comes to designing science experiments) 'less is more' ! With too many samples her test subjects will soon be overwhelmed and might cut corners when it comes to giving an honest assessment of their perceptions of taste. The quality of her results will suffer!

Lauren also shows how she reduces the possibility of peoples expectations influencing the outcome of her experiment (making her more confident of her results). If Lauren had told everyone that the drinks they were sampling were all the same sweetness she would not be truely testing if the colour of the drink was the only factor influencing their perception of sweetness.

Darragh's investigation illustrates how the 'Easier When Repeated' problem can complicate making conclusions. After his test he can't be sure if his friends drink had any real effect. In this case he should have chosen a task that wasn't so much easier when repeated. Other options are to complete the two tests on different days and/or for one half of the group to take the drink with the first test (need to allow time for any possible effects of the drink to wear off before the repeat!)

Using the Learning Reinforcement Cards:

This resource comes with **4 printable cards**. Each card describes an aspect of a possible scientific investigation that would benefit from the use of one or two of these three strategies. Ideally your class would be divided into small groups and they could discuss each scenario and the questions the card asks. If time allows their conclusions could be reported as part of a whole class discussion. Again the emphasis is on engagement. There are no definitive answers. Each card is broadly aiming for the following....

Testing Humans 1: Kira's experiment is quite promising but most importantly she needs to review whether it is a good idea to reveal the full details of the samples **before** the test. For example, some people will already have the attitude that they don't like the taste of tap water and this is likely to influence their judgements of the taste. 'Blind Testing' would definitely produce better results for this experiment. In terms of it's complexity, with five samples it is reasonable but she only really needs two samples to answer the original question; an unlabelled tap water sample and an unlabelled bottled water sample. The person doing the test could be asked to identify which is which, and which one they prefer, **by taste alone**.

Testing Humans 2: In his enthusiasm to extract lots of information about screen using habits Jack has not been realistic about what he can expect people to do in the name of science. People may fill in the diary for the first week but to keep that level of comitment up for a month will be a very big challenge for most people. Also he doesn't really need all that information to answer his own question. He just needs volunteers to record information about their basic screen behaviour in (say) the hour before they go to bed and the information about their sleep habits. For the best results he needs to keep it as simple as possible. If he thinks that the level of detail is important to his study then he would be wise to dramatically reduce the time of his study to a week or a few days.

Testing Humans 3: To feel more confident about the impact of repeating the obstacle course Mr Moran's class have two options to play with. Instead of everyone doing the test in silence the first time round they should **mix it up** with half of the contestants experiencing the crowd noise for their first go and then silence on the second go. Also the obstacle course is in six parts. There is no particular reason why the sections should be in the same order when it is repeated. Mixing them differently for the second go might reduce any advantage due to repeating. This would improve the chance that the **crowd noise** is likely to be the biggest influence in any difference in performance on the two experiences of completing the course.

Testing Humans 4: This example is based on a **real scientific investigation** that was conducted into people who perceived themselves as 'lucky' and 'unlucky'. They carried out their investigation on a much larger number of people and did indeed find that those who regarded themselves as 'lucky' were dramatically more likely to spot the hidden message about claiming a prize. This would seem to imply that people who are 'lucky' may have a better natural radar for positive opportunities and are the architects of their own luck! It was very important in that investigation that the participants had no idea why they were selected for the task. Your students need to decide how much information should be given to the people who complete a task like this. Ideally they should **not** be aware that they have been selected to complete the task on the basis of how 'lucky' or 'unlucky' they think they are? Perhaps Josh and Orla could select people using a questionnaire that only asks this question as part of a wide range of questions. That way people would have any idea why they had been selected to complete the task. They can be told when the tests were all complete.