Handout Sheet 1

This CREST-accredited project can be put towards achieving a CREST Bronze Award

ACCREDITED RESOURCE CREST AWARDS

Investigation Ideas

Background

As part of this project you will need to investigate one aspect of the environment in and around your school. We have created this information sheet to give you ideas of what to investigate and how you could plan your enquiry and collect data.

You don't have to be limited to these options but they might inspire you as to how you could investigate the area you have chosen.

Biodiversity

Biodiversity refers to the diversity of living things in an area. We can talk about biodiversity at different scales, from a single habitat to the whole planet. It often refers to the number of different species, but it can also refer to the genetic variation within a species population, although this is very hard to measure.

Having lots of different plants, animals and insects in an ecosystem is a good measurement that the ecosystem is healthy and helps to sustain life. Having few or even one dominant species shows a vulnerable ecosystem in decline that will not support life well. An area with only one species is called a monoculture. A good example would be a field of intensely farmed wheat. A plant monoculture will only supply limited nutrients for the organisms that feed on it and will be highly susceptible to disease.

Species richness is a measurement of how many different species there are in an area, you could measure the species richness of plants, insects, animals or birds in your investigation. For plants or insects, you could use a 0.5m quadrat to sample the area and count the species that you find within it. To measure the birds or animals, you could count the species during a timed observation. You may need to do some extra research to help you to spot the different species.

There are many ways to improve biodiversity at your school. Planting a variety of flowering plants will help pollinating insects including bees, providing them with a variety of nutrients. Adding a pond or stumpery to your school grounds will likely help a whole variety of species by creating a new habitat. If you are building new habitats, networks of habitats are better than fragmented ones; a pond on the edge of your school field is better than one in the middle of a playground, populations of organisms have a chance to move and mix, creating better genetic and species diversity in each area.

Figure 1. Building a pond is a great way to increase the species richness of an area.

Figure 2. Planting a variety of flowering plants will help pollinators such as bees and promote biodiversity.

Key questions:

- **Will you be investigating the biodiversity of plants, animals, insects or birds?**
- **How will you use this data to improve biodiversity around your school?**

Litter

Nobody likes to wade through rubbish, except perhaps for seagulls! Litter is a problem in many schools and tackling this problem could massively improve the school environment for staff, students and local residents.

There are lots of ways that you could go about investigating how much litter is dropped at your school and why. Litter can be measured in weight, type, distribution or distance from the canteen or rubbish bins, meaning that there are lots of ways that you could produce useful data to help inform your action plan.

To find out whether the availability of rubbish bins is part of the issue, you could measure the litter in different zones of the playground, and compare areas with bins to areas without bins. Another useful experiment would be to find out which foods sold in the canteen produce the most waste.

If litter is a problem at your school then it is likely to be a problem outside the school gates as well. You could investigate the volume of litter on routes to and from the school and compare this with days when the school is closed.

Finding a solution to littering in schools is an age-old problem; your data could provide useful insight that could finally defeat the litter-bugs!

Note that we do not recommend that you wade through litter bins, but instead find a safe method to collect litter samples. Consult with your teacher or CLEAPSS for advice on this.

Key questions:

- **Will you be measuring the volume, type or distribution of litter?**
- **How can you use the data to reduce the amount of litter in the future?**

Noise

Schools can be very noisy places to be in and to be near. The school's neighbours will likely be able to hear when it is lunch or break time and when there is a particularly noisy P.E. lesson going on.

Noise can also be an environmental issue inside a school building. Some schools have thousands of students moving between lessons at once, and at lunchtime there is the noise of cutlery and plates scraping added to the chatter and movement.

Measuring noise requires specialist equipment such as a sound meter and is measured in decibels (dB). If you have access to a sound meter then the measurement will be straightforward and quantitative. If you do not have access to this, then you could use qualitative measurement to identify the volume and types of noise. Noise can be measured for its duration, frequency, audio content and time of day. You might also find that there are different spaces in the school that experience more noise than others, and this may depend on which doors are open or closed.

Identifying the normal background noise will be important to get control data for this investigation. You may need to access the school grounds during a weekend to take measurements at the same times as you will be measuring on a school day.

Reducing noise inside the school building could help concentration and reduce hearing damage. Reducing noise outside the building could improve the environment for local residents. Another outcome is that you may be able to identify the quieter areas within the school, and this could help students who need a break or want to find somewhere to read or work quietly during lunchtimes.

Key Questions

- **Will you be measuring the noise in classrooms, in the playground or the areas outside the school gates?**
- **How will you produce control data for this investigation?**

Classroom Temperature

Overly hot classrooms are no good to anyone. A warm classroom can make it uncomfortable to work and difficult to concentrate. A very hot classroom could affect your health, causing dizziness or heat stroke.

Measuring the temperature across the building in the summer could help to find a solution to this problem by identifying where the hottest and coolest rooms are at different times of the day. You could even produce a heat map of the school!

Collecting data for this might seem easy, but you will need to collect a lot of data around the school at the same time. You could perhaps enlist the help of other students, however, you will need to make sure that they are all performing the tests the same to avoid anomalous results.

Key Questions

- **How will you collect data all around the school at the same time?**
- **How could you display this data?**

Traffic Congestion

Traffic congestion is a major problem in our towns and cities. New buildings such as trains stations require traffic plans to make sure that they don't contribute negatively to the areas where they are built. Many schools suffer from traffic problems outside the school gates contributing to air pollution, noise and increasing the chance of accidents.

There are lots of ways that you could measure traffic congestion. You could count the vehicles passing the school gates at different times of the day, or even measure how congestion changes on different streets around your school to find those worse affected.

As an extension, you could investigate the air quality at different times of the day and in different areas of the school. This will require specialist equipment such as nitrogen diffusion tubes or an air quality meter. Speak to your teacher to find out what equipment is available.

Safety is extra important in this investigation. Makes sure that you stand in a safe place where you are protected from the road when collecting the data, and beware of cyclists as well as cars mounting the pavement to park. You should also wear a high-visibility jacket to make sure that you can be seen by drivers wherever you are.

To reduce congestion, you could suggest a walk to school campaign or an active travel plan, or maybe a traffic plan to reduce congestion from the worst affected streets.

Key Questions

- **How will you stay safe when investigating?**
- **How could you reduce traffic congestion around your school in the future?**

Working with precision and accuracy

When designing an investigation your data must be precise and accurate.

Imagine that you are weighing a football. If the weight shown on the scales is correct to what the weight of the ball is, we can say that the test is accurate. If it is not correct, it is inaccurate. If we repeat the experiment and the scales show the same weight each time, we say that the test is precise. If the scales show a different weight each time, we can say that the scales are imprecise. If the scales show the same weight each time but it is wrong, we can say the scales are inaccurate but precise!

Making sure that your tests are accurate and precise is important for the integrity of your data and your recommendations. Any experiment that you do should be reproducible exactly as you did it, so make sure that you include a full method in your plan and stick to it during the investigation. Complete some preliminary investigations to refine your plan.

Key Questions

- **How will you make sure that your data is precise?**
- **How will you make sure that your data is accurate?**

Things to think about

- Which area of improvement would most benefit wildlife?
- Which area of improvement would most benefit the people in your school community?
- Which area of improvement would most benefit the people outside your school community?