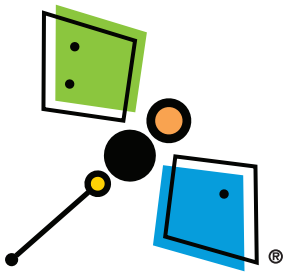
7 Steps of Science Inquiry: DFTV Style

While the elements of science inquiry are generally agreed upon, the science education community has developed numerous strategies for teaching science inquiry to children. Each of these teaching methods has its own merits. Here we present to you the model of science inquiry that you will see in the *DragonflyTV Nano* video series so that you can evaluate how best to incorporate it into your teaching methods.

We've broken down the inquiry process into these seven steps:

1) Choose a topic
2) Develop a question
3) Plan an investigation
4) Predict an outcome
5) Experiment and observe
6) Interpret results
7) Communicate findings

You can focus an activity on just one of these steps or do them all.



1 Choose a topic

This is simply selecting the general subject of the inquiry. On *DragonflyTV Nano*, we portray children who have a personal interest in something they see in a science center or in their daily lives and pursue that interest in the remainder of the story. In your setting, the topic is often determined by the educator. Many of you are familiar with the technique of using a "discrepant event" to engage students in a topic. Even though DragonflyTV does not often use discrepant events as motivators, you may wish to use them in tandem with the *DragonflyTV Nano* video.

2 Develop a question

This is a statement of the research question within the chosen topic. Formulating a sound question is essential to a successful inquiry. Avoid questions that have yes/no answers. Coach kids to write questions that ask about relationships between things.

For example, consider these two questions on the same topic (rolling wheels):

1) "Which rolls faster down a ramp… a large diameter wheel, or small diameter wheel?"
2) "How does the diameter of a wheel relate to how quickly it rolls down a ramp?"

The first question doesn't really require a full inquiry project to find an answer; just grab a large and small wheel, roll them down a ramp, and you have your answer. While it's okay to investigate extremes (like "faster"), scientists usually take the second approach. Scientists investigate how the speed changes when you change the wheels.

To form a strong research question, consider these two generic examples: "If I make a change in X, what will happen to Y?" and "How does this property in situation X compare to the same property in situation Y?" You'll see investigation questions written in these styles throughout this guide and throughout the *DragonflyTV Nano* video collection.

3 Plan an investigation

Your students must think carefully about what sort of equipment and materials they need to investigate the research question. Measuring devices, stopwatches, magnifiers, and other equipment all have a place in a full inquiry. So do recording materials, like computers or plain old pencil and paper! A sound scientific inquiry is characterized by a careful procedure and design. Hallmarks of a good design include: a) multiple trials; b) identification of variables and control of those variables; c) clear choice of which observations or measurements to make. Also, the procedure must directly address the research question.

Given the time constraints of a typical class or after-school session, you will probably have items preselected for your students to use. In that case, have students focus on the procedural issues during this part of the inquiry process. You will see and hear students discussing this part of the process in each *DragonflyTV Nano* video segment.

4 Predict an outcome

In the DragonflyTV model of inquiry, this is not the same as forming a hypothesis. We recommend distinguishing predictions from hypotheses. Encourage students to make a prediction *before* the experiment or observation begins. Encourage them to make a hypothesis *after* they have finished gathering some initial data. Remind students that a prediction that comes out wrong does not signify a failed experiment. On *DragonflyTV Nano*, you'll often hear students discussing why their experimental results were different from what they expected. Encourage your students to do the same.

5 Experiment and observe

Now it's time for students to do the experiment according to their plan and to gather the outcomes. As they implement their agreed-upon process, encourage kids to do what might seem obvious to you: WRITE THINGS DOWN! They can use a notebook, a computer, or whatever helps them collect their data. This behavior is modeled repeatedly on *DragonflyTV Nano*. Such record keeping is easily overlooked by young investigators, who try to rely on memory. Encourage your kids to make a science journal, where they can write down everything they do and discover.

6 Interpret results

This usually means tabulating (literally, putting findings into a table format), averaging, and graphing. Because there are so many ways to display data, this is a chance to bring out creative skills. Creative display of data is a hallmark of DragonflyTV investigations. Encourage your students to be equally creative.

Interpretation eventually leads to a conclusion. The conclusion is a statement that directly addresses the original question, and it should follow from the results of the inquiry. Remind kids that it is acceptable for results to be unclear or ambiguous. And it's OK—even recommended—to raise a brand new question. This question becomes an invitation to research further! Generating further inquires is another hallmark of *DragonflyTV Nano* video investigations.

7 Communicate findings

The final step is sharing outcomes with others. There are many ways to tell a science story. Kids can write about their investigation, including plenty of interesting data. Or they can create a neat and eye-catching display that showcases their work. Finally, they can talk it out. Be sure to leave time in your session for this important phase of the science process.