**RESOURCE:**

**Alternative conceptions about the nature of science**

These are some common misunderstandings about the nature of science – held by students and adults alike. Take any opportunity you can to address these misconceptions in your planning and in your teaching.

**Myth: The scientific method**

Our students are bound to have been taught at some stage that there is a scientific method. They may well have written up numerous reports with the formulaic aim, hypothesis, method, results and conclusion. We need to show our students that there is no single method of science. Indeed, this would be impossible given the incredible range of different disciplines of science. They may, in fact, decide that there are as many different scientific methods as there are scientists.

**Myth: Experiments are the main route to scientific knowledge**

If you were to use word association, many of your students would give ‘experiments’ as their association for ‘science’. Science does involve investigation of some sort, but build the understanding in your students that experiments are just one of many different approaches used. In a number of science disciplines, such as geology, cosmology or medicine, experiments are either not possible or are insufficient, unnecessary or unethical. Students will then see that science also relies on many other approaches like basic observations (such as astronomy) and historical exploration (such as paleontology and evolutionary biology).

**Myth: Science and its methods can answer all questions**

It can be helpful for students to see that there are many questions that science cannot directly answer, such as ethical, moral, aesthetic, social and metaphysical questions. Try a class debate on cloning, stem cell research, the use of sunbeds or any one of a myriad of socio-scientific issues. Students will quickly see that, while science can provide information to inform the debate, it alone cannot provide the answers. Not all questions can be investigated in a scientific manner.

**Myth: Science proves ideas**

Students may have often heard the media refer to ‘scientific proof’. This myth of proof is especially pervasive in advertising: “Glossylocks shampoo. Scientifically proven to keep your hair shiny for twice as long as regular shampoo.” Take opportunities to show your students that, rather than provide ‘once and for all proof’, a hallmark of science is that it is subject to revision when new information is presented or when existing information is viewed in a new light.

**Myth: Science ideas are absolute and unchanging**

Some students will hold a view of science as a fixed body of facts that keeps growing as we do more science and have better technology. Yes, there are some ideas in science that are so well established and reliable and so well supported by accumulated evidence that they are unlikely to be thrown out, but even these ideas may be modified by new evidence or by the reinterpretation of existing evidence. You can help your students appreciate this by looking at cutting-edge research in health and medicine and other areas where ideas may change as scientists try to figure out which explanations are the most accurate. It is important that they see the changing of explanations in science as a strength rather than a weakness.

**Myth: Science is a solitary pursuit**

Ask a class to draw a scientist at work and you are bound to find an over-representation of bald (or wild frizzy-haired), bespectacled, white males working alone in a laboratory with test tubes in hand. This is well researched. You can easily challenge this myth by looking at the profiles of the scientists on the Science Learning Hub. Few work alone, most work collaboratively – and they certainly aren’t all male or bald.

**Myth: Science is procedural more than creative**

If we have a talented artist amongst our students, we are likely to encourage them into some creative endeavour such as photography, architecture or design. But this creativity is needed also in all aspects of scientific research, from coming up with a question, creating a research design, interpreting and making sense of findings or looking at old data in new ways. Remind your students that Leonardo da Vinci was a brilliant artist and was also a leading scientist in aeronautics, anatomy, astronomy, botany, cartography, civil engineering, chemistry, geology, geometry, hydrodynamics, mathematics, mechanical engineering, optics, physics, pyrotechnics and zoology.