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The Association for Science Education
Promoting Excellence in Science Teaching and Learning

why & how?
PRIMARY SCIENCE TEACHING TRUST

Contents

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Editorial Contributions

Main Articles

Practitioner – researcher articles

Regular features

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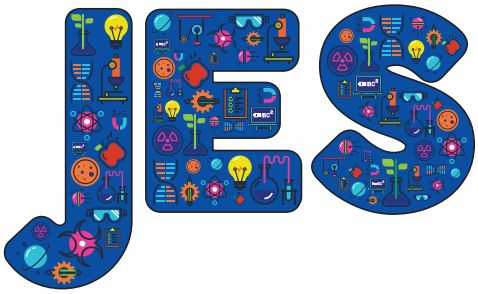
Editorial



Suzanne Gatt

As the world keeps on changing at a fast pace, it becomes more difficult to distinguish between fact and fiction, between real and fake knowledge. As the famous chess player Garry Kasparov tweeted in 2016, '*The point of modern propaganda isn't only to misinform or push an agenda. It is to exhaust your critical thinking, to annihilate truth'.*

It thus becomes important to help future generations to learn, from a very young age, not just knowledge but, more so, how to navigate through different forms of knowledge of different levels of credibility. From early in life, children need to learn to question all the information they come across, check the validity of sources quoted, and take the initiative to test and challenge whatever statement or scientific 'fact' is thrown at them. They also need to be able to communicate their decisions and opinions in such a way that they can hold their ground solidly against arguments based on little or questionable evidence.

The reality presented by the world today also has implications for the type of pedagogical approach that we as teachers need to adopt when doing science with young children. While many are those teachers who have moved away from reading scientific knowledge from a book to one involving hands-on experiments, where scientific phenomena are experienced first hand, this may not be enough to deal with the new challenges of misinformation. Demonstration experiments that illustrate already given and stated scientific knowledge do not allow children to engage critically with scientific phenomena. Whether science involves reading about a topic of interest to find specific information, or interacting directly with the world to understand how it works, it does not give learners the opportunity to develop the skills to question, test, analyse and review their experience of their surroundings in order to obtain a measure of its validity. Such pedagogy still provides limited space for children to talk about, share and engage in argumentation about different ways in which the same observed occurrence can be interpreted and understood.

So what should the learning of science today aim to achieve, and what type of pedagogies have impact on both learning science and for engaging effectively with reality? There has been a lot of pedagogical development as well as research carried out on inquiry-based learning in science. Inquiry science usually involves children formulating questions or hypotheses, which they then go on and test through practical investigations. Children are expected to work in groups, developing shared understandings through social construction of knowledge as they search for answers in response to their initial question. It is only then, at the end, that they communicate their conclusions to others, and possibly engage in reflection on the validity of their conclusions.

Thus, inquiry may not be enough to help children to develop the skills needed to deconstruct the messages around us about the world. It is not enough to test one main idea, to know how to present and defend a conclusion. Children need to start early to compare competing proposals and explanations, to use research and argumentation in favour of one interpretation against a number of others being proposed simultaneously. New pedagogical approaches have to involve exploring actual situations, testing the veracity of statements found on the Internet, on Facebook, for example. It is only through such approaches that they can learn to engage effectively with science, following which they will be able to independently decide whether science-related information circulated and claims about science made by politicians and other players in society are valid or not. Only then can they decide, for example, whether climate change is real, or a hoax as some climate change sceptics

claim. Thus, children learn scientific knowledge and processes of science alongside the process of fact-checking and ensuring rigour of background sources. Of course, this places even greater demands on early years and primary teachers, who already are themselves grappling with this new reality and, as they learn how to navigate through misinformation, they also help young children to learn how to deal with and counteract it.

All the articles in this issue consider different aspects of the real world and how it can be brought into young children's classrooms to make science relevant, as well as highlight its role in society. The paper by **Trew *et al*** takes the example of Santorio's work on the pulsilogium in the 16th century. Through using the mechanism to measure pulse rate, children learn science as they try to unravel how the scientist eventually worked out how the model could work.

In their paper, **Pedreira & Márquez** consider how young children interact with scientific phenomena in an area of exploration in a science museum, which was designed specifically for early years children. **Hansson & Leden** write about trade books (better known as reading books), and how educators can engage children in discussions on the accuracy of the science content, and whether scientists' work is reflected against objective facts. **Shallcross *et al*** describe examples of real cutting-edge science and how young children can investigate scientific phenomena starting from real scientific research.

PSTT also provide a fascinating look at the many benefits to be gained from schools holding designated **Science Days and/or Science Weeks.**

You are invited to read through the papers and be inspired by the initiatives described, so that children get to experience real science within a real context.

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