

Chapter 8

Mentoring for developing scientifically literate citizens

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Introduction

There is considerable research available that shows the need for scientifically literate people in the world. What exactly constitutes a science-literate citizen? Is it, for example, a person who ‘applies scientific habits of minds’ (Huxley, 1882, p.4); one who develops scientific attitudes and exhibits ‘open-mindedness, intellectual integrity, observation, and interest in testing their opinions and beliefs’ (Dewey 1934, p.3); who can communicate between two cultures – science and arts - that results in an understanding and learning of science among families, cultures and societies (C. P. Snow, 1959)? Or is it someone who can engage in ‘self-directed learning in science and technology beyond the school years’ (Rennie, Stockmayer & Gilbert, 2019). Along these lines, we see scientifically literate people as everyday people who may not be working in any science specialist fields (such as a marine biologist or astrophysicist), but are learners who can accumulate and grasp aspects of science while solving everyday problems. They can, for instance, exhibit abilities to research and critique facts on social media, acquire scientific vocabulary so that they can understand if they are hurt or ill, listen to a BBC Radio 5 Science podcast or appreciate the science content in the daily news.

As a framework for this chapter, we ask you first to analyse two stories of non-science professionals. For this, you need to bring your own - and your mentee(s) – personal experiences to bear in deciding what constitutes a scientifically literate person - and how, as science teachers, you might support, develop, advise and guide such people. The second, and longer, part of the chapter provides you with text-based science ideas about mentoring - ideas you can use as they are, or adapt and develop further to support and empower beginning teachers in embedding scientific literacy as a part of their everyday teaching and learning practices. The ambition here is that beginning teachers will help pupils, especially those pupils who are unsure or not interested in continuing with the study of science subjects, to see the learning of science not as an obstacle created by arcane facts, theories and laws, but a highly useful way to live a better and globally informed life.

Objectives

At the end of this chapter, you should be able to:

- Understand that the development of a scientifically literate workforce does not simply entail the production of professional scientists only;
- Build beginning teachers' confidence in incorporating scientific literacy as an integral part of their teaching and learning practices;
- Support beginning teachers towards the use of science texts to critique, compare and contrast contemporary and historical worldwide issues presented in documentaries, news-media and children's stories.

Summary and key points

This chapter has highlighted some of the mentoring strategies to support beginning teachers in developing scientifically literate pupils. Specifically,

- Beginning teachers find difficulty in delivering the curriculum expectation of a broad concept of scientific literacy for all pupils
- There is a need for beginning teachers to recognise that scientific literacy for all includes not only those pupils who want to become scientists but also those who are either not sure of their science education and career paths as well as those who are determined not to carry on with science in the future. It requires pupils to attain less science content knowledge and more of an argumentative and critical habit of mind
- As a mentor, you should aim to support and encourage beginning teachers to use a variety of visual, oral and written texts from historical and contemporary documentary films, news media items and children stories in their lesson planning. The aim is to train pupils to go beyond the fundamental approach of reading, writing, retaining and summarising evidence and facts mainly from the school textbooks (see chapter 5). You should support beginning teachers to include important aspects of conceptualisation, interpretation, discussion, analysis and a critical approach to understanding science related texts in a variety of ways. This approach to the teaching of science will be of enormous value to pupils in their later science or non-science tertiary education, professions and more generally in their lives.

Further reading

Pasquinelli, E. (2012). Neuromyths: why do they exist and persist? *Mind Brain Educ.* 6, 89–96.

This article envisages that teaching through learning styles (Visual, Auditory, Kinaesthetic) is viewed to be equivalent to homeopathy, which is based on personal and/or societal belief with no evidence on its effectiveness; leading to the propagation of confirmatory bias of learning style myths.

Goldacre, B. (2009). *Bad Science*. London, Harper Perennial.

This easy to read book examines various ways in which bad science and pseudo-science in medicine are propagated in social media and how misconceptions in simple scientific terms and processes can lead to bad science.