

# Introducing wonder

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**This section assesses the experience of wonder in young people's education. Wonder is, in many ways, a problematic term to apply to education; the word is more often associated with miracles and magic, with suspiciously supernatural and mystical practices rather than with the more everyday classroom reality of rigorous and measurable educational objectives.**

Asking teachers to encourage 'awe and wonder' in their classrooms as was once advocated by the National Curriculum in England seemed unreasonably idealistic, leaving teachers to question whether its authors had actually faced any restless classes on a wet afternoon. Yet away from the suspicions of mysticism and the more burdensome trials of teaching, the experience of wonder remains a potent element in learning. This section seeks to redefine the relationship between the arts and sciences in education through reconceptualising the idea of wonder.

One of the risks in suggesting that encouraging wonder is an important aspect of learning is that it conjures up images of public demonstrations of scientific experiments that are perhaps heavier on performance than substance. There is a long tradition of public engagement with science through entertainment, not all of which has been designed to offer insights into scientific thought. The 19th-century inventor Thomas Edison, for example, was renowned for promoting his phonograph through performances in which he would conduct conversations with the machine. The sense of wonder that Edison's performances inspired, however, were used to promote consumerist desire rather than to offer technical information. The seductive spectacle of Edison's scientific invention was offered for public amazement, setting Edison apart as one of the first capitalist scientists (Case, 2007, p. 80). Although there are many examples of scientists who have used the medium of performance to encourage public engagement, this legacy has led to the perception that the sense of wonder promoted by performance is more likely to mystify and astonish rather than promote knowledge and understanding.

So how might wonder be rescued from the flimsiness of seduction and applied to the more robust elements of education? One answer might be to examine the aesthetic qualities of science, both intrinsic to science itself and made visible in the interpretation of scientific concepts and ideas in artistic form. The association between the arts, sciences and mathematics is long and enduring; the abstract work of sculptors Henry Moore and Barbara Hepworth, for example, was directly influenced by their contemporaries studying geometry. More recently, in 2007, the artist and designer Helen Storey's collaboration with the physical chemist Tony Ryan, director of the Polymer Centre at the University of Sheffield, has had both scientific and artistic benefits. Motivated by a mutual interest in environmental issues, the collaboration has led to new materials made from polymers that can dissolve. Disappearing bottles, which can be dissolved in hot water, are among the patented products resulting from this collaboration that form part of an exhibition. Displayed alongside these more functional inventions are Helen Storey's explorations of the artistic and aesthetic qualities of the new material, and her dissolving dresses are a central focus of this meeting of laboratory and the studio in the gallery. This project is appropriately entitled 'Wonderland'.<sup>1</sup>

Applied to young people's learning, as drama educationalist Joe Winston points out in this section, a sense of wonderment is allied to the experience of beauty. The beautiful has been associated with feelings of connectivity and pleasure, and has also inspired moral debate about the relationship between beauty and truth. Drawing on the philosophical work of Alexander Nehamas and the aesthetic pedagogy of Mark Girod, Winston makes a persuasive case for the place of beauty in education, both as qualities intrinsic to mathematics and science and as a powerful means of inspiring young people to learn.

Winston's exploration of the pedagogic power of beauty draws attention to the poetics of science, and this is another way to look at the relationship between the arts and sciences in education. Science and mathematics depend on the poetic for their explanations; scientific concepts are frequently reliant on metaphor to communicate ideas and mathematics is rich in abstract symbolism. This is well recognised in literary interpretations of scientific and mathematical concepts; Alice's Wonderland was, famously, a metaphor for the absurdities of life as lived by Oxford's eccentric scientists and mathematicians. Rich in mathematical references, the novel reveals that life, when stripped of illusion, becomes a tale of nonsense. In their work on illusion and perception, neuroscientist Beau Lotto and neuropsychologist Richard Gregory worked with the story of *Through the Looking-glass* to create an exhibition that invited young and not-so-young visitors to explore how their brains perceive visual images.<sup>2</sup> In his chapter in this section, Beau Lotto extends his discussion of the significance of illusion in education. By working alongside the visual artist Sara Downham and head teacher David Strudwick, Lotto suggests how five- and six-year-old children can learn to recognise how they perceive patterns, shapes and illusions in their everyday lives. Through this work, Lotto argues, children's interest is stimulated in the world around them – encouraging them to be, as Alice might have said, 'curiouser and curiouser'. This curiosity is not only a prerequisite for good science education; Lotto and his collaborators also suggest that illusion is a metaphor for education, and exploring perception enables children to see things empathetically from different perspectives and points of view.

If beauty and illusion are significant to science and arts education, their perceived opposites, the monstrous and the grotesque, also attract young people's interest. This interest signals another way to apply wonder to science education; there is an enduring fascination with gothic novels and horror films that test the limits of the possible and the moral that appeal to young people. The artist Elio

Caccavale and science educationalist Michael Reiss have investigated students' interest in the grotesque and miraculous by focusing on chimeras and genetic hybrids. Their work illustrates the importance of raising ethical questions with young people about the effects of scientific developments, especially where nature is modified through new biotechnologies. In this context, the products of the scientific imagination inspire strong emotional responses, not only of wonder and amazement at scientific innovation, but also of repulsion and disturbance to what appears grotesque and unnatural.

Taken together, the authors collected in this section share an interest in the ways in which the pedagogic power of wonder can be integrated into collaborations between artists and scientists in education. Science, like the arts, has aesthetic and poetic qualities, and the authors represented here concur that the senses of curiosity, shock, empathy, pleasure and disgust are all part of the passion of learning. Wonder is, etymologically, an Old English word that has long been allied to the positive qualities of admiration and achievement as well as having more negative associations with a sense of horror and destruction. This is the vocabulary of creativity, ethics and moral debate and, as such, deserves a place in the education of young citizens.

1 [www.helenstoreyfoundation.org/wonderland/1.htm](http://www.helenstoreyfoundation.org/wonderland/1.htm).

2 This was developed in partnership with At-Bristol, and toured nationally. [www.at-bristol.org.uk/explore/alice.htm](http://www.at-bristol.org.uk/explore/alice.htm).

### **Bibliography**

Case S-E. *Performing Science and the Virtual*. London: Routledge; 2007.