SMSC in Science

Spiritual Development

Spiritual education in Science involves the search for meaning and purpose in natural and physical phenomena. It is the wonder about what is special about life, an awe at the scale of living things from the smallest microorganism to the largest tree and the interdependence of all living things and materials of the Earth. It concerns the emotional drive to know more and to wonder about the world and aesthetically appreciate its wonders including for example the enormity of space and the beauty of natural objects or phenomenon, plants, animals, crystals, rainbows, the Earth from space etc.

Moral Development

Moral education in Science encourages pupils to become increasingly curious, to develop open mindedness to the suggestions of others and to make judgements on evidence not prejudice. Students realise that moral dilemmas are often involved in scientific developments. When considering the environment, the use of further natural resources and its effect on future generations is an important moral consideration, as is the use of stem cells in modern technology and genetic engineering.

Social Development

Social education involves group practical work which provides opportunities for pupils to develop team working skills and to take responsibility for investigative analysis and the safe handling of chemicals. Pupils must take responsibility for their own and other people's safety when undertaking practical work. Science has a major effect on the quality of our lives. Pupils are encouraged to consider the benefits and drawbacks of scientific and technological developments and the social responsibilities involved in contributing to scientific research and development.

Cultural Development

Cultural education in Science involves promoting scientific discoveries as an integral part of our own culture and indeed other cultures. Science is also seen as a contemporary activity with many different career opportunities that stem from scientific developments made all over the modern world. Scientific research is undertaken by a wide range of men and women in many different cultures both now and in the past. Another important aspect of cultural development in Science is noting that the interdependence of the world in environmental issues is central to Science as we know it.

Some Examples of SMSC in Science across Biology, Chemistry & Physics

- Pupils gaining an insight into the chemical nature of natural changes in the lithosphere, hydrosphere, atmosphere and biosphere.
- Pupils debating the ethical issues surrounding current issues such as stem cell cloning to cure diseases.
- Learning about the future implications of the use of finite resources such as crude oil and possible landscape changes due to global warming.
- Learning about theories concerning the creation of the universe and evolution of life with consideration of religious beliefs. This leads to understanding possible genetic modification and cloning, is this ethically wrong or essential?
- Looking into the future options for the production of electricity, alternative fuels, and methods to reduce pollution with discussion of how these can improve people's lives and the environment in general.
- Pupils investigate the historical impact of scientists from around the world from different cultures and backgrounds. This includes studying the importance of women scientists (Franklin and Curie), as well as those from the BAME and LGBT groups (Drew and Turing).
- Pupils considering how scientific perceptions can alter across the planet; from the phases of the moon, the life cycle of a star and the use of satellites, the safety of food additives and the local importance of recycling.
- Learning about cells as the building blocks of life and how they have evolved from primitive cells, how they divide, how they are linked to cancer and other diseases and how antibiotics and bacterial resistance could become a prominent focus in the science and health sectors this century.
- Investigating photosynthesis and how plants produce food. This is linked to how we can feed a growing global population and the moral dilemma of whether to use crops for food or for biofuels.
- Studying animal physiology such as the lungs and the heart and analysing how coronary heart disease affects a large percentage of people and why.
- Upskilling students with knowledge about risk factors and how to stay healthy is a huge area within Biology and SMSC. This is linked to reproduction, when teaching X and Y chromosomes, reproductive organs and the fact that some people are intersex, contraceptives (taking into account religious beliefs), sperm donation, IVF and surrogacy for gay/lesbian parents.
- Investigating ecology and the essential nature of the carbon and nitrogen cycles in maintaining balance.

- Studying radioactive decay, half-life and how radioactive materials can be used innovatively in medicine. This is then linked to nuclear fission and fusion. Discussing how these processes have been used in modern history and how they might be utilised in the future are key aspects of SMSC development.
- Pupils learning about the electromagnetic spectrum and its multiple uses. In terms of visible light, this then leads to a study of lenses, how the eye forms an image and magnification.
- Analysing energy changes, endothermic and exothermic reactions, and how this has led to the development of cells, batteries and fuel cells more recently.
- Learning about chemical changes that affect the environment and the society we live in and how we can analyse samples to identify components of a mixture. This is important in terms of forensic analysis and can be used as key evidence in maintaining British values and democracy.
- Students understanding the importance of sustainable development. From potable water, the use of alloys and polymers to alternative methods of metal extraction and the Haber process. Having materials available for future generations to use is a key area of current scientific research and development.