

Science (1999)

Years 1 to 10

Sourcebook Guidelines

(Part 2 of 8)

Note: The PDF version of this document has been split into sections for easier download. This file is Part 2 of 8.

Learners and learning in Science

The Science key learning area recognises that students are innately curious about their world and explore it in a variety of ways. From an early age students use their physical, social and cultural experiences to make sense of the phenomena around them. Students of different genders, with different socioeconomic, cultural, geographic, ethnic and linguistic backgrounds, and with disabilities and learning difficulties, will have experienced life differently. Students may use different language and different ways to describe their understandings of their experiences.

Through their interactions with, and observations of, natural objects and events, peer culture, language, and everyday sayings, students develop their own intuitive understandings of why things happen in the physical and biological worlds.

From their unique experiences, students may develop concepts that do not conform to current scientific ideas. Recognition that learners may have alternative ideas and ways of learning encourages teachers to:

- develop strategies to access students' ideas;
- provide experiences that promote learning to:
 - assist students reflect on their understandings;
 - develop in students scientific understandings, dispositions and practices;
 - assist students apply these scientific understandings, dispositions and practices in their everyday life.

Developmental characteristics

As students mature, they exhibit different developmental characteristics. Students develop and achieve in different ways, at different rates and at different stages. One way to consider these ways, rates and stages is to look at them as four broad overlapping phases of typical development corresponding to the bands of schooling — lower primary, middle primary, upper primary and lower secondary.

Lower primary students

These students tend to focus on the world around them. They often have their own explanations of how things work. They interpret new information in terms of their own experience, and new experiences in terms of their existing ideas. Learning takes place through direct experience, observation, discussion, stories, play and a range of problem-solving strategies. As their view of the world expands, students begin to develop a scientific vocabulary and begin exploring the relationships between natural phenomena. Although students may be cooperative, they tend to work in parallel rather than in collaboration.

Middle primary students

These students are beginning to explore their local environment and the world beyond. They are increasing their skills at seeing things from other points of view. They make links between their personal knowledge and experiences, and information obtained from other sources. Most students need assistance in finding patterns in their data, making summaries and suggesting explanations for their observations. Independently and cooperatively they work scientifically to develop their conceptual understandings. They are developing confidence in changing, generating and adapting ideas and techniques for different situations.

Upper primary students

These students are developing a sense of wonder that extends beyond the world around them. They are concerned to know how science ideas can be used to improve the environment. They understand that different cultures may approach problems in science in different ways, and that this may have affected past scientific and technological developments. Students are able to deal with more than one concept at a time, and they begin to progress in their thinking from the concrete to the abstract. They are able to relate familiar contexts to unfamiliar situations. They learn to value and recognise logical reasoning and fairness. They need considerable practice and encouragement to examine all the evidence they collect and to challenge their own views.

Lower secondary students

These students begin to develop their concerns about issues beyond their communities. They are interested in understanding the world in relation to how it affects them and how human activity impacts on the environment. Students are interested in their own physiology and development. They endeavour to use science to assist their understandings. Students question existing practices and priorities and challenge teachers to provide tasks that they perceive as relevant.

Inclusiveness

Diversity in students' ethnic, cultural and family backgrounds and individual interests and values should be considered and respected when implementing activities for students. These differences, while requiring students to be accepting and sensitive about individuals' diversity, can stimulate rich and varied discussion on a wide range of issues.

The syllabus provides teachers with the basis to design a science curriculum that is inclusive of all students. It encourages and provides teachers with the flexibility to:

- acknowledge, value and build upon the diverse backgrounds, life experiences and interests of students;
- determine and build upon students' prior understandings;
- be cognisant of students' diverse learning styles;
- provide learning activities that consider the needs of students with a disability or particular learning needs;

- utilise a diverse range of assessment techniques and instruments that are in accordance with the principles of social justice;
- draw upon a diverse range of real-life and lifelike contexts.

The syllabus makes provision for all students to:

- value contributions that women and men from diverse backgrounds have made to science;
- appreciate the beauty, wonder and awe of many natural phenomena;
- understand some ways that science has improved the quality of human life;
- recognise the non-neutral nature of many scientific endeavours and contributions;
- view science as a human endeavour that is not free from bias.

Using a learner-centred approach

A learner-centred approach to learning and teaching views learning as the active construction of meaning, and teaching as the act of guiding and facilitating learning. This approach sees knowledge as being ever-changing and built on prior experience.

In the Science key learning area, a learner-centred approach provides opportunities for students to practise critical and creative thinking, problem solving and decision making. These involve the use of skills and processes such as recall, application, analysis, synthesis, prediction and evaluation, all of which contribute to the development and enhancement of conceptual understandings. A learner-centred approach also encourages students to reflect on and monitor their thinking as they make decisions and take action. As students think and work scientifically, they construct understandings of scientific concepts.