

Recommendations

The Royal Society of Biology makes the following recommendations about the school biology curriculum:

<p>1 The biology curriculum should develop pupils' understanding in three dimensions:</p> <ul style="list-style-type: none"> • how biological science is done, including ways in which biological scientists work to develop scientific explanations • a body of core concepts about the structures, functions and interactions of organisms and their environments • the applications and impacts of biological science in the world. 	<p>When designing a biology curriculum it is necessary to consider the fundamental question: what should young people learn about biological science while at school? The answer is certainly more than a collection of facts.</p> <p>The biological sciences provide explanatory narratives that bring together observations and ideas to help explain biological phenomena. Biological scientists have characteristic ways of working, thinking and reasoning that enable them to construct these explanatory narratives; the resultant body of understanding has applications and impacts for society, including benefits, risks and ethical issues.</p> <p>Developing pupils' understanding in these areas helps them to explain the biological world and to construct answers to questions they may have. It also prepares them to transition into further study or the workforce, and helps them to emerge from school as scientifically literate citizens able to engage critically with, and make informed decisions about, biological issues in everyday life.</p>
<p>2 The biology curriculum should aim to develop pupils' understanding of big ideas in biology to answer big questions in biology.</p>	<p>Prominent thinkers in science education have attempted to distil the enormous body of concepts that are explored in school biology education into a small number of 'big ideas'. These big ideas help to explain a great number of observations and phenomena in the biological world. It has been suggested that the myriad concepts taught in biology lessons can be organised to form a series of learning progressions that build understanding of the big ideas of biology – or, perhaps, that build answers to big questions in biology.</p> <p>Previous biology curricula have been criticised for being too content heavy. A 'big ideas' organisational framework helps to provide a focus on concepts that are key to building understanding of the big ideas (or answering big questions) of biology.</p>
<p>3 The biology curriculum content that is set out in policy and guidance documents should enable coherent learning progression from age 5-19.</p>	<p>If the biology curriculum is defined in a series of stages or age ranges, there should be continuity between earlier and later stages. It should be possible to see how understanding of key concepts and development of key competencies is expected to progress from the start to the end of each stage, and from each age range to the next (including across transition points between school levels). To avoid overload, each concept or competency should earn its presence and age-appropriate position in the curriculum as part of a learning progression, building on prior learning and/or building a foundation for further study.</p>
<p>4 The biology curriculum should provide pupils of all ages with ample opportunities to engage in practical and investigative work, including in the field.</p>	<p>Biological science relies upon the collection of observations and measurements to develop scientific explanations for biological phenomena, and this is often a practical endeavour. Practical work can be used purposefully in school biology lessons to develop pupils' scientific knowledge and understanding of the biological world, their ability to use scientific equipment and follow standard practical procedures, and their understanding of scientific approaches to enquiry. It may also increase pupils' engagement and motivation, and help to develop transferrable skills and attributes such as communication, teamwork and perseverance.</p> <p>There is substantial research evidence suggesting that fieldwork helps pupils to develop their knowledge and skills in ways that add value to their experiences in the classroom.</p>
<p>5 The biology curriculum should provide pupils of all ages with ample opportunities to learn about plants and other organisms, in addition to humans and other animals.</p>	<p>A focus on, or preference for, learning about animals (zoocentrism) has been reported in pupils, teachers and textbooks, and there is a 'leaky pipeline' of plant science undergraduates and workers. As a result, there have been high-level calls for the increased inclusion of plant-related learning opportunities in all levels of the biology curriculum to help overcome 'plant blindness' by fostering increased engagement with and knowledge of plants and other organisms.</p>
<p>6 The development of biology curriculum policy, guidance and content should draw upon previous curriculum development work and evidence from research, where appropriate.</p>	<p>The designers of a new biology curriculum should not start from scratch. Much work has been put into the development and revision of curricula, including for the nations of the United Kingdom, and lessons have been learnt from their implementation. With some caution, inspiration may be taken from comparisons with high-performing international jurisdictions. There exists a large body of published research into children's understanding of biology and the effective sequencing of ideas; accessible summaries have been provided by Project 2061 (American Association for the Advancement of Science), Rosalind Driver and colleagues, and the Best Evidence Science Teaching project (University of York Science Education Group), amongst others.</p>
<p>7 The biology curriculum content set out in policy and guidance documents should be clear, teachable and assessable, while allowing scope for innovation in delivery.</p>	<p>The biology curriculum should be expressed with sufficient clarity to facilitate good alignment between it and the various mediating and assessment instruments that will be created based upon it, including lessons, teaching resources, textbooks, specifications and examinations. This requires striking a balance between specifying without ambiguity what is expected to be taught and allowing sufficient scope for rich contextualisation and innovative teaching and assessment approaches.</p>
<p>8 The biology curriculum should be contemporary yet durable.</p>	<p>Biology is a fast-moving science, with ever increasing breadth and advancements of technologies relevant to biological sciences and interdisciplinary areas in the sciences. The biology curriculum content set out in policy and guidance documents should be up-to-date, reflecting the knowledge and practices of the contemporary biological sciences, but it should also be expressed in sufficiently future-proof terms to reduce the need for regular updates of the curriculum and the disruption this causes in schools.</p>