

Royal Society of Biology response to the Institute for Apprenticeships' T Level consultation on proposed outline content

January 2019

3. The knowledge and skills in the core content will enable someone to develop a broad understanding relevant to the sector

The Royal Society of Biology (RSB) is working with the bioscience and education communities to develop an informed position for a framework for a coherent 5-19 biology curriculum.¹ The RSB want to ensure that students, at all educational stages and through all qualification routes, engage with a biology curriculum that is coherent and prepares them for their next steps in life. This includes progression from compulsory schooling into further and higher education, and beyond.

The RSB curriculum framework includes a 5-19 exemplification, which presents the essential concepts in biology within the context of five big questions of biology. The five big questions encompass the ideas that all students should have the opportunity to learn by the end of compulsory education. The big questions are posed for the following age ranges: 5-7, 7-11, 11-14, 14-16 and 16-19 and are split into themes, which include detailed content statements. A map detailing the big questions and themes within them across 5-19 has been published on our website.²

In this response, we explore the RSB curriculum content down to theme level. However, we would welcome the opportunity to engage with Awarding Organisations on the detailed content statements within these themes. The 5-19 curriculum framework is still in development, with the 5-19 exemplification due to be finalised in early 2019. The RSB has used draft versions of this exemplification to engage with curriculum developers and policy makers. A suite of documents on a framework for the biology curriculum will be published in 2020.

Health and Healthcare Science

Based on the RSB curriculum framework, the Health and Healthcare Science core content include biological concepts that we would expect students' to have met in a classroom context by the age of 16. The overlap between our exemplification and the life science content in the Health and Healthcare Science routes suggest the content will enable T Level students to develop a broad understanding of biological concepts relevant to the sector.

¹ Developing a framework for the biology curriculum (SSR September 2018)

https://www.rsb.org.uk/images/SSR_September_2018_23-29_McLeod.pdf

² https://www.rsb.org.uk/images/Mapping_the_biology_curriculum.pdf

Charles Darwin House, 12 Roger Street, London WC1N 2JU Tel: +44 (0)20 7685 2550 info@rsb.org.uk

The T Level core content covers the following content in the RSB 5-19 exemplification:

T Level core content	RSB exemplification	
	Theme	Sub-theme
Structure and function of cells and tissues	Tissues, organs and systems	Cell structure and function
Large molecules	Biochemistry	Biological molecules
Exchange and transport mechanisms	Tissues, organs and systems	Exchange and transport
Genetic information and inheritance	Growth and development, Inheritance and the genome	
Microbiology	Interdependence of organisms, Environmental interactions and processes	
Impact of lifestyle on health	Health and non-communicable disease	
Population health approaches	Animal and plant defences against disease	
Human anatomy and physiology	Tissues, organs and systems	Coordination and control, Exchange and transport
Diseases and disorders	Health and non-communicable disease, Communicable disease, Diagnosis and treatment of disease	
Immunology	Communicable disease, Diagnosis and treatment of disease, Animal and plant defences against disease	
Importance of hand washing and good personal hygiene	Communicable disease	
The meaning of antimicrobial resistance	Diagnosis and treatment of disease	

Within the Health and Healthcare Science routes, the core content focuses on three of the five big questions from the RSB 5-19 curriculum framework:

- What are organisms and what are they made of?
- How do organisms stay healthy?
- How do organisms grow and reproduce?

We would expect each of the occupational specialism routes to have a particular focus on the big questions, depending on the area of specialism, but would not expect the core content for each specialism to cover all five of the big questions. For example, we would expect Pharmacy Services to focus on the big question ‘How do organisms stay healthy?’ and sub-themes within it, but not ‘How do organisms live together?’ However, students would be expected to have covered concepts across all 5 big questions during their 5-16 education.

Science

Based on the RSB curriculum framework, the Science core content includes biological concepts that we would expect students' to have met in a classroom context by the age of 16. The overlap between our exemplification and the life science content in the Science routes suggests this content will enable T Level students to develop a broad understanding of biological concepts relevant to the sector.

The T Level core content covers the following content in the RSB 5-19 exemplification:

T Level core content	RSB exemplification	
	Theme	Sub-theme
Structure and function of cells and tissues	Tissues, organs and systems	Cell structure and function
Large molecules	Biochemistry	Biological molecules
Exchange and transport mechanisms	Tissues, organs and systems	Exchange and transport
Genetic information and inheritance	Growth and development, Inheritance and the genome	
Microbiology	Interdependence of organisms, Environmental interactions and processes	
Cell cycle	Reproduction	
Cellular respiration	Biochemistry	Cellular respiration
Enzyme and protein structure	Biochemistry	Biological molecules
Pathogens	Communicable disease	
Classification of biological materials	Biochemistry	Biological molecules

Within the Science route, the core content focuses on three of the five big questions from the RSB 5-19 curriculum framework:

- What are organisms and what are they made of?
- How do organisms stay healthy?
- How do organisms grow and reproduce?

We would expect each of the occupational specialism routes to have a particular focus on the big questions, depending on the area of specialism, but would not expect the core content for each specialism to cover all five of the big questions. For example, we would expect the Laboratory Sciences occupational specialism to focus on the big question 'What are organisms and what are they made of?' and have less of a focus on 'Why are organisms so different?' However, students could be expected to have covered concepts across all 5 big questions during their 5-16 education.

The core content for the Science route includes elements on 'Scientific methodology' and 'Data handling and processing.' This core content is essential for enabling students to develop an analytical approach to solving scientific problems and developing inquiry skills. These sections overlap with the RSB 5-19 curriculum framework big question 'How do we study the biological world?' which focuses on the processes of biology and practical work.

4. The content for the occupational specialism(s) contain the right knowledge and skills to allow someone to gain employment within that specialism.

The Association of the British Pharmaceutical Industry (ABPI) highlight immunology and genomics as the highest priority areas in the pharmaceutical industry, in terms of recruitment of skilled workers at graduate level.³ Animal technology and histology are medium to high priority areas, which are in particular need of non-graduate level staff (p19). Informatics, computational, mathematical and statistical topics are also high priority areas, in particular needing those who can combine interdisciplinary skills. The core knowledge and skills within this sector that are a cause for concern are discussed on page 35.

In terms of gaining employment with a pharmaceutical specialism, Figure 13 (p29) shows where non-graduate recruitment is a particular issue.

5. Is there anything missing from the content from occupational specialisms?

6. Is there anything in the content for the occupational specialisms that is unnecessary?

7. Do the occupational specialisms cover everything a person needs to learn to be able to work in that specialism?

9. Overall, is the outline content suitable for teaching in a classroom-based setting?

The practical skills content for the Health, Healthcare Science and Science routes may require flexibility for teaching in a classroom-based setting, as the presence of under 18s in bioscience laboratories or healthcare environments could cause issues.

Health and Safety training will be required (as highlighted in the core content outline) and in some cases employers may be required to inform their insurance provider. There will be industry mandated limits on activities under 18s are allowed to complete, and as a result it may be that students can only observe some activities in an industry setting.⁴ The opportunity to offer classroom-based alternatives will depend on whether under 18s are able to enter laboratories for a particular occupational specialism.

The resources and availability of practical equipment vary between colleges. This has the potential to limit accessibility of courses for students within particular geographical areas. The Institute for Apprenticeships and Technical Education should review geographical coverage and ensure all students have the opportunity to access all T level routes. In some cases this may require financial support for students to travel, or additional funding for colleges to maintain and update equipment and facilities.

Developing practical technical skills is an essential part of the T Level qualification. The resources and availability of practical equipment may also vary by employer. Where these opportunities or resources are

³ ABPI report 'Bridging the skills gap in the biopharmaceutical industry: Maintaining the UK's leading position in life sciences' due for publication January 2019. References given are correct at the time of writing.

⁴ Response from the Royal Society of Biology to the Department for Education's consultation on 'Implementation of T level programmes' (February 2018) https://www.rsb.org.uk/images/RSB_T_level_consultation_response_6_February_2018.pdf

not already available, the Department for Education should ensure that the appropriate funding and provisions are in place for students.