

Evolving 5-19 Biology

The Role of Practical Activities in Biology



Royal Society of
Biology

Introduction

Knowledge in biology results from research involving practical activities. Practical work in schools allows students to engage in these processes so that they can begin to understand the explanatory power and limitations of scientific ideas. The practices of biology and the applications of biology are two of the three dimensions of the Royal Society of Biology's *Evolving 5-19 Biology: recommendations and framework for 5-19 biology curricula (2021)*¹. Practical skills, field work and understanding of investigative work are vital parts of the schools and university experience, and are essential in order to develop a rounded understanding of the biological sciences.

In *Evolving 5-19 Biology*, Recommendation 4 states that the biology curriculum should provide pupils of all ages with ample opportunities to engage in practical and investigative work, including in the field. This is evidence-based, with research suggesting that fieldwork helps pupils to develop their knowledge and skills in ways that add value to their experiences in the classroom².

The type of research undertaken by professional biologists depends upon the questions that they are trying to answer. Practical activities in school biology courses model the approaches typically adopted by professional biologists. Students experience how scientists produce knowledge in biology, and how they work to solve real world problems. These activities improve students' scientific literacy and increase their science capital.

Transferable skills developed by practical activities

In schools and universities, a course of practical work can develop important skills:

- Increasing students' scientific knowledge and understanding of the biological world;
- Expanding their ability to use scientific equipment and follow standard practical procedures;
- Advancing their understanding of the nature of science and scientific approaches to enquiry;
- Enhancing skills and attributes such as communication, teamwork and perseverance;
- Stimulating student engagement and motivation.



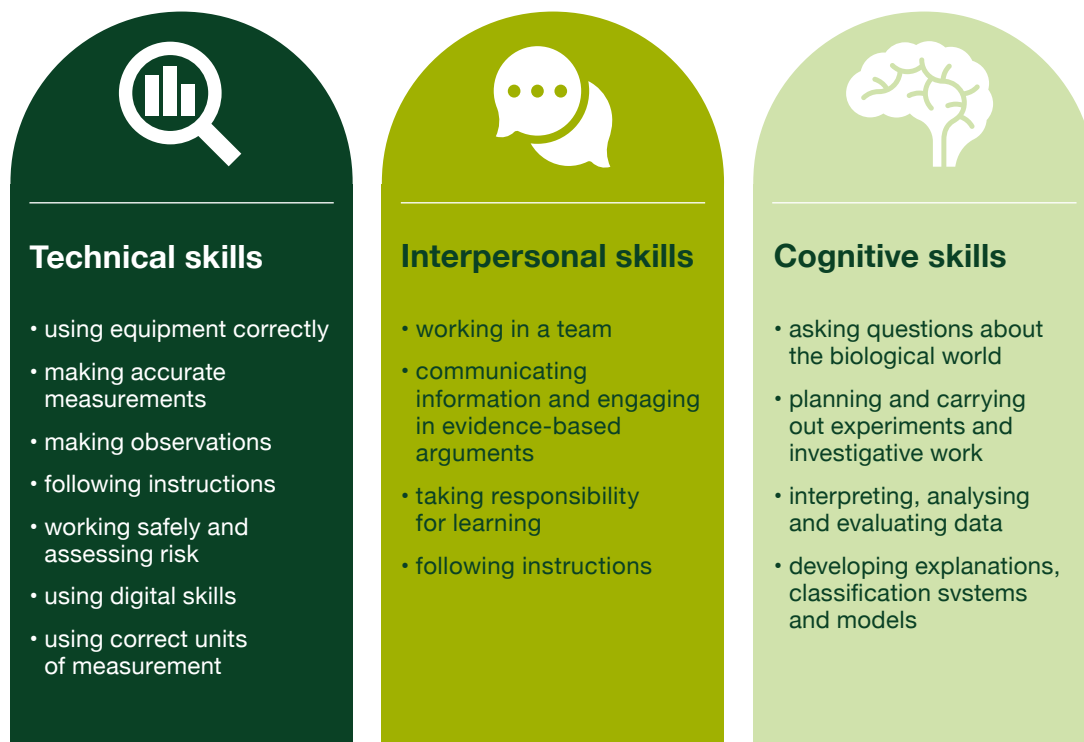


Fig. 1. Skills acquired through practical activities

Practical activities facilitate the development of skills and attitudes that allow students to prepare for contemporary workplaces. Some of these skills are shown in Fig. 1.

Biology is the study of the living world and practical activities can take place outdoors or indoors, e.g. in laboratories or classrooms. Outdoor activities can range from a guided walk in a park observing seasonal changes in plants and animals, through to ecological studies on organised field trips. Cross-curricular links with geography and history can strengthen students' holistic experiences of a location.

Practical activities can range from closed activities where students follow an established protocol to verify biological ideas that have previously been taught, through to open ended "inquiry" activities that are planned and undertaken by students, where they are addressing questions that are unfamiliar to them.

There are many intermediate forms of investigation where the context or structure of the investigation is partially determined in advance of the activity. The Practices dimension of *Evolving 5-19 Biology* recommends that students gain experience of the full range of practical activity during their biology education.

Implications for teaching and learning in the sciences

All young people must experience curricula which prepare them to be scientifically literate, able to make scientifically informed choices, and prepare them for a diverse and evolving world of work. Practical work and the development of practical skills are highly valuable and must be an integral part of all biology taught in schools, colleges and universities.

The Royal Society of Biology recommends³:

- Curriculum designers: Curricula should provide ample opportunities to engage in practical and investigative work, including work undertaken in the field.
- Government: Funding should be provided to support the resourcing of practical work in schools, colleges and universities. Specific consideration should be given to more deprived areas.
- Schools: Practical work should be purposeful and be used to aid the understanding of the biological world, drawing on RSB's *Evolving 5-19 Biology* and Gatsby's *Good Practical Science*.
- Awarding organisations: Curricula should be constructed to allow students to develop a deep understanding of scientific principles alongside developing scientific skills that will serve them no matter their career path.



About the **Royal Society of Biology**

The Royal Society of Biology (RSB) is a single unified voice for biology: advising government and influencing policy; advancing education and professional development; supporting its members, and engaging and encouraging public interest in the life sciences. The RSB represents a diverse membership of individuals, learned societies and other organisations. Individual members include practising scientists, pupils at all levels, professionals in academia, industry and education, and non-professionals with an interest in biology.

The RSB seeks to support biology education at all levels, and actively engages with education policy through formal consultation responses, convening special interest groups and collaborating and coordinating with other science organisations.

As part of our next steps following publication of *Evolving 5-19 Biology: recommendations and framework for 5-19 biology curricula*, this document forms part of a suite of summaries and further consideration into aspects of the framework, with a view to signposting resources to, and disseminating best practice for teachers who are developing school, curriculum and qualifications policy, evidence-based teaching orders and interdisciplinary areas of study.

www.rsb.org.uk/curriculum

Please cite as Evolving 5-19 Biology: The role of practical activities in Biology, Royal Society of Biology (December 2023)

References

1. Evolving 5-19 Biology: recommendations and framework for 5-19 biology curricula (November 2021)
2. Dillon, J., et al. (2006). The value of outdoor learning: evidence from research in the UK and elsewhere. *School Science Review*, 87(320), 107-111.
3. Education Policy Priorities 2023-2028, Royal Society of Biology (April 2023)

Further reading:

CLEAPSS: <https://science.cleapss.org.uk/Resources/Guides/>

Gatsby Good Practical Science: <https://www.gatsby.org.uk/education/programmes/support-for-practical-science-in-schools>

Royal Society of Biology and Nuffield Foundation: <https://practicalbiology.org/>

Science and Plants for Schools: <https://www.saps.org.uk/>

QAA Biosciences Benchmark Statement: <https://www.qaa.ac.uk/the-quality-code/subject-benchmark-statements/subject-benchmark-statement-biosciences>

With thanks to:

Andy Chandler-Grevatt
Kathy Freeston
Neil Ingram
Joy Parvin
Claire Pike
Helen Watson
Jonathan Weston
Bethan Wood
Helen Woodfield

