

Practical work – making it more effective

Sarah Earle discusses an influential paper from Robin Millar and Ian Abrahams on the role of practical work in science lessons; each month, members of the ASE Research Group will suggest how other important papers from *SSR* could be used as the subject of a journal club in your school or department



Article summary

This Millar and Abrahams (2009) article discusses the effectiveness of student practical work. While noting that teachers and students feel that practical work is an important part of science lessons, the authors question whether there is clarity around the purpose of such activities. Effectiveness is considered in two ways: firstly, whether students do and see what is intended; and, secondly, whether students learn what is intended (acknowledging that this is much harder to measure). The authors identify three types of objective for practical work: (A) illustrating ideas, (B) practising procedures, and (C) developing enquiry processes. Summarising findings from a study of 25 lessons in eight secondary schools, the authors note that in the majority of lessons in the sample, the focus was on ‘*producing the phenomenon*’, with very little discussion of scientific concepts. They propose that the focus on ‘hands on’ was at the expense of ‘minds on’, meaning that, while a practical may seem effective in that the students have done what was expected, learning was not maximised because the development of scientific understanding was not supported. They also note that the ‘learning demand’ of the activity should be taken into account. The authors argue that effective practical work needs to be both ‘minds on’ and ‘hands on’ and that the former needs more attention in order to develop student learning.

Full article

Millar, R. and Abrahams, I. (2009) Practical work: making it more effective. *School Science Review*, 91(334), 59–64. Available to ASE members at: www.ase.org.uk/resources/school-science-review/issue-334/practical-work-making-it-more-effective and to all at: www.gettingpractical.org.uk/documents/RobinSSR.pdf.

Questions to support reflection and discussion

These questions can support you and your colleagues to engage with issues arising from reading this article:

- Do you find the distinction between completing the intended practical and developing the learning a useful way to consider the effectiveness of practical work?
- What do you think of the way that Millar and Abrahams have categorised the purposes of practical work as: (A) illustrating ideas, (B) practising procedures, and (C) developing enquiry processes?
- What would you say if it was suggested that practical work may serve different purposes with different age groups or in the different disciplines of science?
- How do you think practical work could be made more effective in your setting?
- Do you feel that the debate about practical work has moved on since this article was published? In what ways is it the same/different?
- How do you think discussions around managing cognitive load could add to this debate?

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From the archive: ‘Promoting the understanding of mathematics in physics at secondary level’

An article by **Alaric Thompson**, Head of Physics at Ulverston Victoria High School, published in the March 2016 issue of *School Science Review* (volume 97, number 360, pp.43–48)

Do you find that your students compartmentalise their learning? Do they struggle to transfer maths skills from maths lessons to their physics learning or even from one physics topic to another?

This article explores some of the common mathematical difficulties that 11- to 16-year-old students experience with respect to their

learning of physics. It shares strategies for approaching the language of mathematics, the meaning behind formulae, the importance of ‘is equal to’ and the rearrangement of simple equations.

This article can be found at www.ase.org.uk/resources/school-science-review/issue-360