
Learning science outside the classroom: bringing it all together

Sometimes we place too much emphasis on school, forgetting that pupils' experiences and learning in science do not begin and end at the school gates. We tend to ignore, or at least play down, the crucial influences that experiences outside school have on pupils' knowledge and understanding, and on their beliefs, attitudes and motivation to learn. In recent years there has been huge investment to provide opportunities to communicate science to various visitor groups in museums, science centres, botanic gardens, zoos, field centres and at industrial and commercial sites. This wider educational experience for learners is often in stark contrast to formal school science.

Opportunities for out-of-school learning are now more numerous and diverse than ever and the quality of communication about science is often excellent. Teachers and trainee teachers can learn much about teaching science from these contexts. The professional standards for qualified teachers (standard 3.1.5 in QTT, TTA, 2003) recognise the need to provide basic knowledge of the planning involved in out-of-school learning, but a recent review of research by the NFER (Rickinson *et al.*, 2004) shows that coherent and detailed advice and examples of good practice in this area are often hard to find. The NFER report also shows that specialisation and modularisation in undergraduate science courses has tended, for example, to produce Biology graduates with little or no knowledge of ecology, and therefore lacking the confidence to lead field studies.

Using the evidence of our research and experience within this field, we have attempted to

address these issues and provide coherent advice for teachers and trainees in a publication (Braund, M. and Reiss, M. (eds) *Learning Science Outside the Classroom*, RoutledgeFalmer). Practical guidance for teachers, trainees and others involved in both primary and secondary education, enabling them to widen the scientific understanding and experience of pupils, is offered through case studies, together with contributions from practitioners in all fields of science education. The more familiar contexts, such as museums, zoos, botanic gardens, field centres, farms and school grounds, are all covered. Less familiar examples also feature and include science and chemistry trails, planetaria, space centres and freshwater habitats. The explosion in communications media in recent years, e.g. in multi-channel TV and the Internet, has resulted in a huge number of high quality opportunities and experiences for school-aged pupils and we have included advice and discussion on how teachers might get the most from these 'home learning' opportunities.

As the informal sector has expanded, so has research in out-of-classroom learning. We have drawn on much of this to provide the sort of advice that teachers and others need to help obtain the best educational advantages for their pupils from these contexts, without making the experiences too much like school. One of the main concerns that teachers, quite rightly, have about working outside the classroom is pupil safety. We have provided extensive advice about this and each chapter of the book has been carefully checked by us and by the CLEAPSS School Science Service, to ensure that any recognised

hazards have been identified and appropriate measures and precautions suggested so as to reduce risk.

If we want young people to have a more realistic view of science and how it operates in society, we believe it is time to break out of the strictures of school-only science and to provide a curriculum that is more authentic. By this we mean one in tune with the wider world of learning science that recognises what goes on out-of-school, and is able to draw on ways of communicating science in informal settings to people who are not like the captive audience in schools. This is essential if we are serious about educating a generation and motivating at least part of it to want to find out more about science.

References

- Rickinson, M., Dillon, J., Teamey, K., Morris, M., Choi, M. Y., Sanders, D & Benefield, P. (2004) *A Review of Research on Outdoor Learning*. Slough: National Foundation for Educational Research.
- TTA (2003) *Qualifying to Teach: Professional Standards for Qualified Teacher Status and Requirements for Initial teacher Training*. London: Teacher Training Agency.

Martin Braund is a Lecturer in Educational Studies at the University of York. He runs the PGCE science course at York. **Michael Reiss** is Professor of Science Education and Head of the School of Mathematics, Science and Technology at the Institute of Education, University of London.