



Science education provides pupils with opportunities to develop not only a better understanding of the world and its possibilities and difficulties but also elements of self-advocacy – including: an understanding of choice; the development of skills and competences; confidence in taking risks, and feelings of being noticed, encouraged and supported as they develop confidence and autonomy.

The revised National Curriculum in England and Wales, implemented in 2000, sets out three specific principles that should underpin the development of a more inclusive curriculum. These are: setting suitable learning challenges; responding to pupils' diverse learning needs; and overcoming potential barriers to learning and assessment for individuals and groups of pupils. Easily stated, these principles are much more difficult to put into practice in both general terms and subject-specific contexts.

All science teachers and educators have a responsibility to take up the challenge by ensuring that inclusion is at the core of what we do in planning the structure and content of the curriculum and in designing our schemes of work. Most of the articles in this issue of *SSR* explore how inclusion might be approached in relation to teaching children who have a range of learning difficulties, and provide practical suggestions for use in the classroom.

The first four articles offer practical advice and resources that the authors have developed in order to support their colleagues and themselves in translating the specified curriculum into a form that is more appropriate for the range of pupils they teach. Jill Bancroft,

in describing the process of developing materials to support the KS3 strategy in England and Wales, highlights the importance of engaging pupils with activities which are age-appropriate whatever the attainment level of the pupils, and the value of multisensory approaches to learning. Shân Oswald and her group, Liz Singleton and Lawrence Chapman in their articles offer different perspectives on planning learning experiences, target-setting, and monitoring progress and achievement when working with pupils of all ages who may be achieving below National Curriculum level 1, yet are making progress in very small steps.

Andy Piggott provides an overview of a range of approaches to, and choices about, differentiation and illustrates how one approach might be implemented. Shirley Simon took on the challenge of using the CASE approach with pupils of widely differing abilities. In her article she sets out how it was possible to help the different groups of pupils engage with the activity yet sustain a level of cognitive challenge appropriate to the differing needs, abilities and experiences of the pupils concerned.

The importance of language in the process of learning is emphasised by Wendy and Jerry Wellington, who consider a range of ways in which language difficulties can be a barrier to pupils making progress, and by Stephen Rowcliffe who focuses specifically on dyslexia. Kevin Wright, who works with deaf and hearing-impaired pupils, reminds us of the importance of adapting the teaching environment to help improve communication and good practice in other matters such as health and safety. The final article on inclusion,

by David Kumar, provides a view from the United States. It reminds us that the challenges we face in the UK are not unique, and that enhancements in learning and teaching in the classroom or other setting cannot take place without appropriate support and provision at local and national level.

These articles do not cover the full range of issues to do with inclusion in science education but they should provide ideas and activities that all science teachers can use and develop. The exchange of ideas about how to contribute to the development of a science curriculum for social inclusion can be continued on the ISSEN (Inclusive Science for Special Education Needs) website (www.issen.org.uk), described in *Notes and News* on page 12. This provides a mechanism and an opportunity for us all to carry on the debate.

This is the first of a series of special issues of *SSR*. However, not all articles in a special issue will necessarily be about the specific topic: there is still room for articles and science notes

about other topics and content. Also in this issue, Jonathan Osborne and Mary Ratcliffe report on the feasibility and development of assessing *Ideas and evidence* in the National Curriculum for Science in England and Wales. Peter Campbell follows up the theme of citizenship, explored in *SSR 302* (September 2001), by describing curriculum materials developed to support the teaching of citizenship in science lessons. These are disseminated via the ASE Science Year CD-ROM, *Can we; should we?*

We always welcome Science notes and we wish that more readers would send them in. Ross Morley's note describes how a 'potential disaster' was turned into an inspirational and stimulating teaching activity in which the pupils were teaching him as much as he was teaching them. Geoff Auty's note describes how entertaining, off-beat demonstrations can be used to educate pupils about difficult ideas. Please keep them coming!

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