

## Unto the Next Generation

Peter Atkins\*

### Chemical Education: Towards Research-based Practice

Eds J. K. Gilbert, O. de Jong, R. Justi, D. F. Treagust, and J. H. van Driel,  
Kluwer, Dordrecht. 2003, 425 pp.  
ISBN 1-4020-1184-9, Softcover, € 50.

Chemical education is a rather strange beast. No other branch of science indulges in its own educational practice to such a degree as chemistry does, and despite its centrality to the whole pedagogical enterprise, chemical education, and particularly chemical educators, are regarded as suspicious by their research-based colleagues. This ambitious book is intended to transform the latter attitude by demonstrating that chemical education is a deeply serious pursuit and that a professional attitude towards the provision of education reaps rich rewards. John Gilbert captures the essence of the book in one of his remarks, where he emphasizes the essential role of structured enquiry into chemical education rather than lazy reliance on 'hunch and uninterrogated intuition'.

The plethora of editors might seem like an army of generals, but they are there for a purpose. The battleground has been divided into five sections, ranging from the philosophical to the practical, and each editor commands one of them. Each section has its own useful preface, and there is a helpful overall foreword (by Dorothy Gabel) which establishes the intellectual context of the entire collection. In all there are seventeen chapters from a wide variety of authors, including many names familiar to and respected by the community. Although tastes will vary, it will be a peculiarly stubborn and hidebound chemical educator who will not benefit from the reflections inspired by at least some of the chapters.

John Gilbert commands the philosophical section on 'Chemistry and Chemical Education'. Here the most interesting discussions are on the role of history in helping to establish the often abstract concepts of chemistry and on the concept of model. One of the perpetual conundrums of chemical education is the effectiveness of laboratory work, and the section concludes with an analysis of its role. Jan van Driel takes the battle forward into more practical territory in the section dealing with curriculum development. As he points out, there is a central tension between different and often conflicting aims, with potential professional chemists, the general citizen, and the specialized vocational student all vying for attention and often being presented with a course that muddles the approaches or fails to respect their particular demands.

The next two sections step further into detail and consider specific problems. David Treagust is in command of one section. The three chapters in this section explore the problems of teaching the particulate nature of matter, which is perhaps the most central of all concepts as it provides the very currency of chemical explanations, the nature of bonding, and that intrinsically seemingly unsurmountable metaproblem,

the teaching of problem-solving. As he points out, we cannot fail to become better teachers by appreciating the difficulties that students encounter. Rosária Justi extends the analysis in her section, which deals with thermodynamic and kinetic aspects of chemical change and that marshy bog for understanding, electrochemistry.

With chemistry analyzed in such detail, all that is needed is to explore how teachers should be prepared. This final section is edited by Onno de Jong. In a final coda, all the editors combine to explore the lessons learned from the analysis, and examine the future of research into chemical education and the manner in which its impact might be increased. This is a fitting conclusion to a book that should stimulate wide interest and more thoughtful teaching.

\* Peter Atkins is Professor of Chemistry at the University of Oxford and the author of numerous textbooks. He is chairman of IUPAC's Committee on Chemistry Education.