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Research into practice

Neuroscience in the classroom

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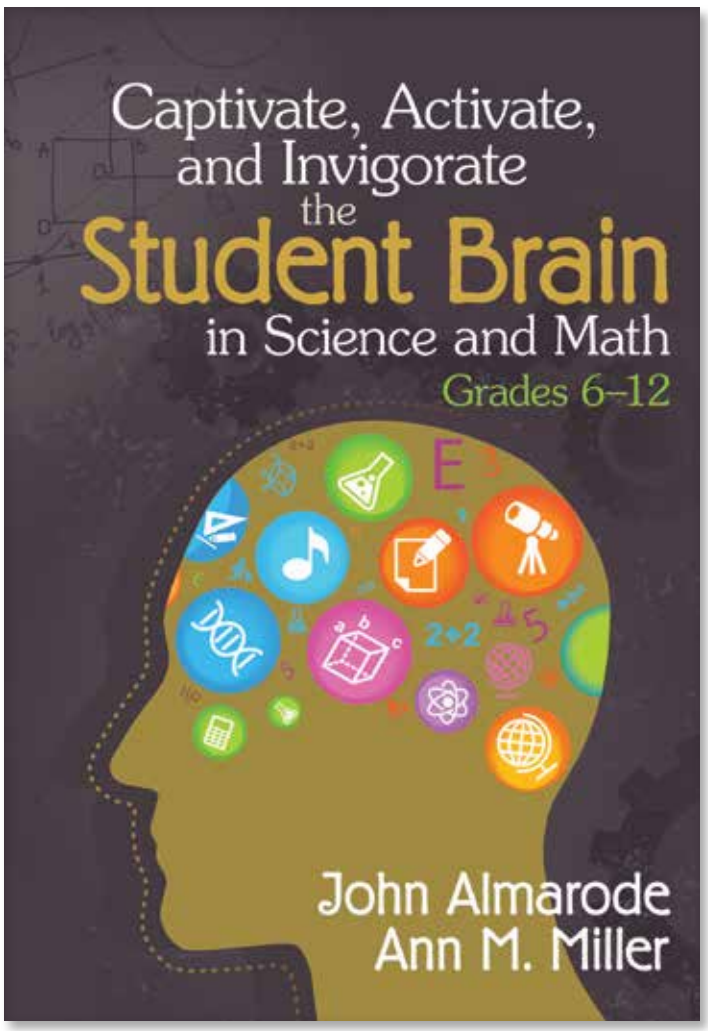
Captivate, activate and invigorate the student brain in science and math
John T Almarode and Ann M Miller
Corwin
2013 | 224pp | £18.99 (PB)
ISBN 9781452218021
Reviewed by Jane Essex
http://amzn.to/1ePFNCr

This is a book written for a US audience, which will inevitably limit its immediate appeal for other readers. There does, however, appear to be a slight resurgence in interest in the implications of the applications of neuroscience to classroom practice, which it will help to meet.

The neuroscience itself is basic, but gives a useful overview without burdening the reader with excessive technical detail. It will serve as a readable introduction or refresher for teachers or trainees. It also provides an extensive list of academic references, which will be useful for anyone who wishes to read further about the neuroscience. The chatty and informal style makes for easy reading on a weighty subject, although the colloquial writing style may seem slightly strange to a European audience.



The book provides a few reminders to experienced teachers and may offer new teachers a different way of considering what goes on in their classroom. One such reminder was the clear message to consider the learners' affective state, including their attention and motivation, whose roles in effective learning is clearly explained. There is a strong argument for developing thinking skills and technical vocabulary, both of which remain relevant to teachers of science.

However, the usefulness of the book's advice on teaching is limited by the huge differences in educational practices in the UK and US, to which it inadvertently draws our attention. It is difficult, for example, for UK teachers to imagine teaching a lesson undifferentiated for a range of learners, whereas this is presented as cutting-edge practice in the book.

The most significant reservation that could be levelled at the book is that, despite its title, it isn't ultimately about the unique challenges that the teaching and learning of science (and maths) presents, and what neuroscience can tell us about addressing them effectively. While the examples used to illustrate the concepts are drawn from these two areas of the curriculum, it will disappoint anyone who is expecting more than a generic account of how neuroscience can help to inform classroom practice.

Understanding matter

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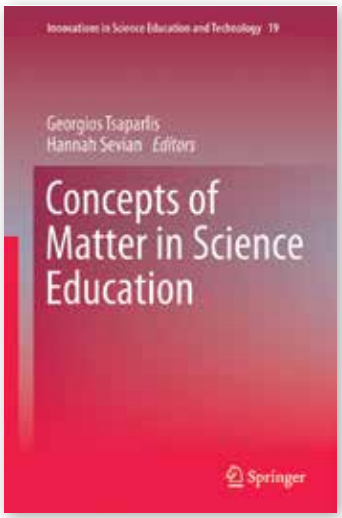
Concepts of matter in science education
Georgios Tsaparlis and Hannah Sevian (eds)
Springer
2013 | 400pp | £117 (HB)
ISBN 9789400759138
Reviewed by Vanessa Kind
http://amzn.to/1aEtwyv

This substantial book, organised in six sections, offers 21 chapters



emerging from a 2010 symposium held in Athens, Greece, on *Particulate and Structural Concepts of Matter*. I would normally classify symposium texts as 'worthy' but of relatively limited value. However this one resembles finding diamonds in kimberlite rock.

I started at the back of the book, for no other reason than to make sure I included those chapters. Reward was instant. In the *Chemical Structure and Bonding* section, Keith Taber's chapter on learners' conceptions of chemical stability, change and bonding was the equivalent of discovering a Cullinan diamond. He provides an analysis of alternative frameworks held by students, which is simply a 'must-read' for anyone teaching chemistry at school or university. I also enjoyed Meijer, Bulte and Pilot's *Macro-Micro Thinking with Structure-Property Relations,* which relates contexts with content in skilful and engaging ways.

The final section on the history and philosophy of science offers further gleaming gems, discussing the historical development of atomism and developing a scientifically sound understanding of concepts of matter.

Earlier chapters report international researchers' empirical studies. Part one focuses on learning progressions,

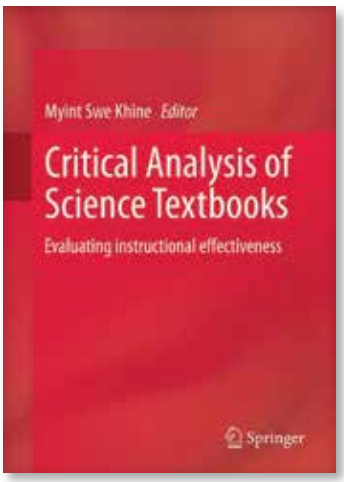
a current trend in science education research. Topics that stand out here include a tried and tested 15 lesson sequence for lower secondary students and a carefully crafted set of engaging activities for developing young children's thinking.

Part two explores aspects of students' and teachers' mental models of the particulate nature of matter. Again, plenty of strategies are available to help students and teachers develop better understanding of the concept of matter and how to teach it, including diagnostic instruments and tests. Part three offers two extremely useful chapters that use technology, and the fourth section presents research on applying the particle model to chemical reactions and phenomena.

As with any composite text, this is not perfect. Writing styles vary and are heavy at times. Tighter editing would have cut material that doesn't shine with the authority of the rest. But any chemistry teacher digging into this book will find something of value to help them help their students to more clearly 'see' and understand the concept of matter.

Investigating textbooks

Critical analysis of science textbooks
Myint Swe Khine (ed)
Springer
2013 | 280pp | £90 (HB)
ISBN 9789400741676
Reviewed by Canan Nakiboğlu
http://amzn.to/1aGwQfv



Critical analysis of science textbooks enlightens readers about how textbook analysis is a very rich domain to investigate and how textbooks influence science teaching and learning processes. The contributors to this book discuss the challenges and opportunities regarding textbook analysis and present their findings.

The book has 15 chapters and is organised in four parts. Each chapter deals with a different issue and this provides flexibility for readers. The opening section of the book introduces the criteria for evaluating the quality of science textbooks. It discusses the development of a graphical analysis protocol, an instrument that quantifies the type and quality of graphical representations and how they interact with textual material.

Part two covers textual and language analysis. Specifically, chapter five presents an analogy classification framework, which is employed to examine the use of analogy in science textbooks. I found this very helpful for researchers who study analogies in textbooks – a crucial issue in science education.

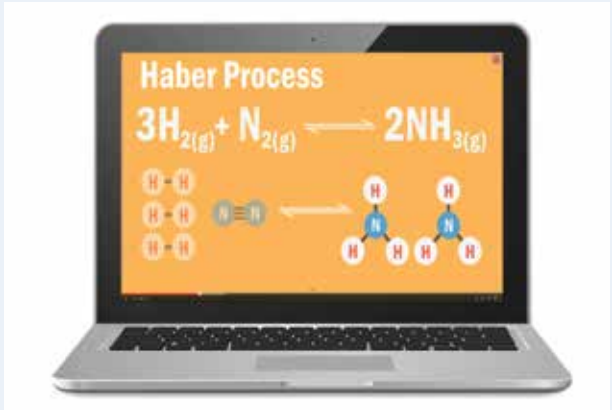
Part three presents several useful research efforts in the context analysis of the textbooks, and explores methodological issues in each chapter. Textbooks from different educational contexts, including England, the US, Finland and Australia, are examined. This variation provides an insight into both the textbooks and the curriculum reforms of different countries. Part four presents a practical overview of all sections of the book by summarising the findings and issues presented.

Although this book is aimed at researchers who study textbook analysis, I found it useful for science teachers and textbook authors as well. Furthermore, it provides particularly helpful starting references for novice researchers who plan textbook research projects, as it informs about current approaches in the scientific analysis of textbooks from multiple perspectives.

Web watch

FuseSchool's YouTube channel

Reviewed by Josh Howgego
http://bit.ly/1jwJsLH



FuseSchool, a global education initiative, has released a series of 68 short animations explaining concepts in chemistry. It calls them *The Chemistry Journey* and the idea is to provide a free and rather comprehensive educational resource for teachers and learners around the world. But the videos make nice, compact revision aids for any student.

What's featured? Almost everything on your GCSE chemistry syllabus, from the basics, including how ions form, to applied ideas, such as quarrying and making soap.

The collection was compiled by experienced teachers working with animators, so you'll find nuggets of wisdom tucked away in the clips. For example, students are advised to remember that cations are positively charged ions using the phrase 'a cat has paws' (with the 'cat' and the 'p' for paws signifying the relationship).

Yet teachers from the UK should watch out for the terminology used in some of the videos. For example, the piece on Le Chatelier's principle (http://bit.ly/1g6GwCc) talks about reaction equilibria becoming 'stressed' (without a clear explanation of what this term means) before they are shifted to one or other side. This unfamiliar language could conceivably confuse students who haven't come across it before.

It's noticeable that the huge array of videos has been produced by different teams in different regions. Perhaps it is this that has led to the subtle differences in language. The videos I watched that were voiced by an English presenter lacked these confusing elements, so it is a pity that *FuseSchool* hasn't obviously attempted to organise the videos by regional relevance.

In fact, if teachers are to make use of this interesting resource, it will be worth them checking the quality of each video before they think of incorporating them into their lessons.

One showed a bizarre marking (that looked like a dot denoting a radical) on what was supposed to be an ion. But others, such as the offering on alkanes and alkenes (http://bit.ly/1fYJ5E9), were supremely clear and made an excellent effort to keep students engaged, asking them to pause and work out general rules based on presented examples.