

Teaching Secondary Chemistry

"This book is about best practices in chemistry teacher education"--

Enhance your teaching with expert advice and support for Key Stages 3 and 4 Chemistry from the Teaching Secondary series - the trusted teacher's guide for NQTs, non-specialists and experienced teachers. Written in association with ASE, this updated edition provides best practice teaching strategies from academic experts and practising teachers.

This book will provide invaluable support whether you are a newly-qualified science teacher, an experience teacher of chemistry who wants to extend the range of strategies and approaches used, a biologist or physicist who has to teach chemistry, or a student training to be a teacher. Each chapter covers a broad section of the curriculum and is divided into topics. For each topic the book covers: - The pupil's possible Previous knowledge - A suggested Teaching sequence with activities necessary to cover the basic physics - Warnings about pupils' misconceptions, common problems with individual activities and safety issues - Further activities that develop the pupils' understanding of the topic - Enhancement ideas that relate the science to everyday contexts and provide new ideas for experienced teachers - Suggestions for using ICT TThis second edition reflects the requirements of current secondary science curricula, ideas from recent curriculum development projects and innovations in IT. This book draws on the experience of a wide range of teachers and those involved in science education. It has been produced as part of the Association for Science Education's commitment to supporting science teacher by disseminating best practice and new ideas to enhance teaching.

As teachers we often tend to expect other countries to teach chemistry in much the same way as we do, but educational systems differ widely. At Bielefeld University we started a project to analyse the approach to chemical education in different countries from all over the world: Teaching Chemistry around the World. 25 countries have participated in the project. The resulting country studies are presented in this book. This book may be seen as a contribution to make the structure of chemistry teaching in numerous countries more transparent and to facilitate communication between these countries. Especially in the case of the school subject chemistry, which is very unpopular on the one hand and occupies an exceptional position on the other hand – due to its relevance to jobs and everyday life and most notably due to its importance for innovation capacity and problem solving – we have to learn from each others' educational systems.

This is a reproduction of a book published before 1923. This book may have occasional imperfections such as missing or blurred pages, poor pictures, errant marks, etc. that were either part of the original artifact, or were introduced by the scanning process. We believe this work is culturally important, and despite the imperfections, have elected to bring it back into print as part of our continuing commitment to the preservation of printed works worldwide. We appreciate your understanding of the imperfections in the preservation process, and hope you enjoy this valuable book.

Many studies have highlighted the importance of discourse in scientific understanding. Argumentation is a form of scientific discourse that plays a central role in the building of explanations, models and theories. Scientists use arguments to relate the evidence that they select from their investigations and to justify the claims that they make about their observations. The implication is that argumentation is a scientific habit of mind that needs to be appropriated by students and explicitly taught through suitable instruction. Edited by Sibel Erduran, an internationally recognised expert in chemistry education, this book brings together leading researchers to draw attention to research, policy and practice

around the inclusion of argumentation in chemistry education. Split into three sections: Research on Argumentation in Chemistry Education, Resources and Strategies on Argumentation in Chemistry Education, and Argumentation in Context, this book blends practical resources and strategies with research-based evidence. The book contains state of the art research and offers educators a balanced perspective on the theory and practice of argumentation in chemistry education.

The teacher with the responsibility of teaching chemistry at the secondary level for the first time is immediately confronted with the task of administering a program of instruction, which includes the problems of both the classroom and laboratory. Very few of these specific problems have been presented previously in either chemistry or education courses. The genuine need for additional material to serve as a practical guide for the beginning high school chemistry teacher has suggested this study and to this end it is dedicated. A critical survey of the literature indicated that these problems have been frequently discussed, but little effort has been made to bring them together with possible answers and suggestions into a syllabus type outline. After personal interviews verified the need of a study to answer these questions, a suitable questionnaire was sent to secondary chemistry teachers of several secondary schools mainly in the greater Kansas City and some in the Sacramento, California, areas. As a result of the information obtained from the questionnaire and the study of problems which chemistry teachers face, several recommendations are made. The lack of training of most secondary chemistry teachers makes it necessary that help, understanding, and cooperation come from the college teacher. A chemistry methods course should be included in the curriculum of all future chemistry teachers. In this way, the bridge could be built over the gap between the chemistry and education courses. State requirements for certification of chemistry teachers are quite low. This fact and the rapidly changing nature of chemistry indicate that continued preparation, through advanced courses, should be taken by all teachers of chemistry. The area of considerable weakness is in the history of chemistry and most teachers in the Kansas City area expressed a desire for a "History of Chemistry course". This should be offered at regular intervals by the university. Problems of text book and laboratory manual selection, purchasing supplies, and safety measures are salient problems of all chemistry teachers. Possible solutions, or helps for solutions, are offered to assist the chemistry teacher in solving these problems. The features of chemistry that make it such a fascinating and engaging subject to teach also contribute to it being a challenging subject for many learners. Chemistry draws upon a wide range of abstract concepts, which are embedded in a large body of theoretical knowledge. As a science, chemistry offers ideas that are the products of scientists' creative imaginations, and yet which are motivated and constrained by observations of natural phenomena. Chemistry is often discussed and taught largely in terms of non-observable theoretical entities - such as molecules and electrons and orbitals - which probably seem as familiar and real to a chemistry teacher as Bunsen burners: and, yet, comprise a realm as alien and strange to many students as some learners' own alternative conceptions ('misconceptions') may appear to the teacher. All chemistry teachers know that chemistry is a conceptual subject, especially at the upper end of secondary school and at university level, and that some students struggle to understand many chemical ideas. This book offers a step-by-step analysis and discussion of just why some students find chemistry difficult, by examining the nature of chemistry concepts, and how they are communicated and learnt. The book considers the idea of concepts itself; draws upon case studies of how canonical chemical concepts have developed; explores how chemical concepts become represented in curriculum and in classroom teaching; and discusses how conceptual learning and development occurs. This book

will be invaluable to anyone interested in teaching and learning and offers guidance to teachers looking to make sense of, and respond to, the challenges of teaching chemistry.

This book is aimed at chemistry teachers, teacher educators, chemistry education researchers, and all those who are interested in increasing the relevance of chemistry teaching and learning as well as students' perception of it. The book consists of 20 chapters. Each chapter focuses on a certain issue related to the relevance of chemistry education. These chapters are based on a recently suggested model of the relevance of science education, encompassing individual, societal, and vocational relevance, its present and future implications, as well as its intrinsic and extrinsic aspects. "Two highly distinguished chemical educators, Ingo Eilks and AviHofstein, have brought together 40 internationally renowned colleagues from 16 countries to offer an authoritative view of chemistry teaching today. Between them, the authors, in 20 chapters, give an exceptional description of the current state of chemical education and signpost the future in both research and in the classroom. There is special emphasis on the many attempts to enthuse students with an understanding of the central science, chemistry, which will be helped by having an appreciation of the role of the science in today's world. Themes which transcend all education such as collaborative work, communication skills, attitudes, inquiry learning and teaching, and problem solving are covered in detail and used in the context of teaching modern chemistry. The book is divided into four parts which describe the individual, the societal, the vocational and economic, and the non-formal dimensions and the editors bring all the disparate leads into a coherent narrative, that will be highly satisfying to experienced and new researchers and to teachers with the daunting task of teaching such an intellectually demanding subject. Just a brief glance at the index and the references will convince anyone interested in chemical education that this book is well worth studying; it is scholarly and readable and has tackled the most important issues in chemical education today and in the foreseeable future." – Professor David Waddington, Emeritus Professor in Chemistry Education, University of York, United Kingdom

This book synthesizes theoretical perspectives, empirical evidence and practical strategies for improving teacher education in chemistry. Many chemistry lessons involve mindless "cookbook" activities where students and teachers follow recipes, memorise formulae and recall facts without understanding how and why knowledge in chemistry works. Capitalising on traditionally disparate areas of research, the book investigates how to make chemistry education more meaningful for both students and teachers. It provides an example of how theory and practice in chemistry education can be bridged. It reflects on the nature of knowledge in chemistry by referring to theoretical perspectives from philosophy of chemistry. It draws on empirical evidence from research on teacher education, and illustrates concrete strategies and resources that can be used by teacher educators. The book describes the design and implementation of an innovative teacher education project to show the impact of an intervention on pre-service teachers. The book shows how, by making use of visual representations and analogies, the project makes some fairly abstract and complex ideas accessible to pre-service teachers.

This dissertation, "The Perception of F.5 Students on the Impact of Environment Protectioneducation in Certificate Chemistry in

Hong Kong" by Ching-wang, Miao, ???, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. DOI: 10.5353/th_b3195973 Subjects: Chemistry - Study and teaching (Secondary) Environmental education - Study and teaching (Secondary) Chemistry - Study and teaching (Secondary) - China - Hong Kong Environmental education - China - Hong Kong Education, Secondary - China - Hong Kong - Curricula High school students - China - Hong Kong - Attitudes Secondary school students - Attitudes Social surveys - Secondary school students Education, Secondary - Curricula

Teaching Chemistry can be used in courses focusing on training for secondary school teachers in chemistry. The author, who has been actively involved in the development of a new chemistry curriculum in The Netherlands and is currently chair of the Committee on Chemistry Education of the International Union of Pure and Applied Chemistry, offers an overview of the existing learning models and gives practical recommendations how to implement innovating strategies and methods of teaching chemistry at different levels. It starts at the beginner level, with students that have had no experience in secondary schools as a teacher. After a solid background in the theory of learning practical guidance is provided helping teachers develop skills and practices focused on the learning process within their classrooms. In the final chapter information is given about the way teachers can professionalize further in their teaching career. Addresses innovative teaching methods and strategies. Includes a section of practical examples and exercises in the end of each chapter. Written by one of the top experts in chemistry education. Jan Apotheker taught chemistry for 25 years at the Praedinius Gymnasium, Groningen. In 1998 he became a lecturer in chemistry education at the University of Groningen, retired in 2016. He is currently chair of the Committee on Chemistry Education of the IUPAC.

This dissertation, "The Development and Evaluation of an Individualized Learning Programme for the Teaching of Organic Chemistry at Form Six Level" by ????, Kit-lin, Margaret, Hung Ip, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. DOI: 10.5353/th_b3120467 Subjects:

Chemistry, Organic - Study and teaching (Secondary) Chemistry, Organic - Programmed instruction

Chemistry is a conceptual subject and, in order to explain many of the concepts, teachers use models to describe the microscopic world and relate it to the macroscopic properties of matter. This can lead to problems, as a student's every-day experiences of the world and use of language can contradict the ideas put forward in chemical science. These titles have been designed to help tackle this issue of misconceptions. Part 1 deals with the theory, by including information on some of the key alternative conceptions that have been uncovered by research; ideas about a variety of teaching approaches that may prevent students

acquiring some common alternative conceptions; and general ideas for assisting students with the development of appropriate scientific conceptions. Part 2 provides strategies for dealing with some of the misconceptions that students have, by including ready to use classroom resources including copies of probes that can be used to identify ideas held by students; some specific exercises aimed at challenging some of the alternative ideas; and classroom activities that will help students to construct the chemical concepts required by the curriculum. Used together, these two books will provide a good theoretical underpinning of the fundamentals of chemistry. Trialled in schools throughout the UK, they are suitable for teaching ages 11-18.

Chemical education is essential to everybody because it deals with ideas that play major roles in personal, social, and economic decisions. This book is based on three principles: that all aspects of chemical education should be associated with research; that the development of opportunities for chemical education should be both a continuous process and be linked to research; and that the professional development of all those associated with chemical education should make extensive and diverse use of that research. It is intended for: pre-service and practising chemistry teachers and lecturers; chemistry teacher educators; chemical education researchers; the designers and managers of formal chemical curricula; informal chemical educators; authors of textbooks and curriculum support materials; practising chemists and chemical technologists. It addresses: the relation between chemistry and chemical education; curricula for chemical education; teaching and learning about chemical compounds and chemical change; the development of teachers; the development of chemical education as a field of enquiry. This is mainly done in respect of the full range of formal education contexts (schools, universities, vocational colleges) but also in respect of informal education contexts (books, science centres and museums).

This dissertation, "A Study to Develop a Typology of the Perceived Teaching Styles of Hong Kong Secondary School Chemistry Teachers Using a Technique of Cluster Analysis" by Mun-ling, Fung Lo, ???, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. DOI: 10.5353/th_b3195500 Subjects: Chemistry - Study and teaching (Secondary) Chemistry - Study and teaching (Secondary) - China - Hong Kong Teaching - China - Hong Kong - Case studies Cluster analysis Social surveys - Chemistry teachers Teaching

Organic compounds are ubiquitous in nature. They are present in food, commercial products, domestic materials, and all the cells of the human body. The realization that the chemistry of organic compounds permeates all life forms, often stimulates the desire of many students to pursue studies in medical- and natural-chemistry-related fields. In my own

case, although I had always been fascinated by chemistry in general, I only opted to study it at a higher level by default. This is because prior to my university education, I barely understood its various concepts. But this changed dramatically when at university, I was lucky enough to be taught by some very inspirational, experienced and internationally-acclaimed chemistry teachers, who actually lived the subject. Interestingly, even then, there were only a few relevant, user-friendly textbooks on the subject. As I have discovered over the years, organic chemistry is so broad and covers so much that for effective delivery, not only must those who teach the subject constantly adopt innovative methods of teaching, there must also be readily-available and easy-to-read textbooks. Because of the apparent complexity of the subject, organic chemistry teachers must always aim to instill a love of learning for it, by imparting knowledge in ways that can be motivating and exciting. When students have access to relevant, user-friendly textbooks and lessons are made interactive, simple, clear and exciting, rather than dominated by learning by rote, organic chemistry can be both interesting and easy-to-understand. This book is an attempt to contribute to the growing body of knowledge that aims to stimulate students' interest, and love for the wonderful world of organic chemistry. The intention is to equip students with the basic concepts, so they can refrain from simply memorizing, but rather seek to understand and not be intimidated by it.

The aim of this study was to investigate how an experienced chemistry teacher gains and refines her pedagogical content knowledge (PCK) by cooperating with two grade 12 students (age 18) as coteachers while teaching chemical bonding in a grade 10 Upper secondary class. The study has been conducted from a sociocultural perspective, especially Vygotsky's zone of proximal development (ZPD) (Vygotsky, 1978). Other theoretical concepts and models that have framed this study are Shulman's Pedagogical content knowledge (PCK) and Pedagogical reasoning and action model (Shulman, 1986, 1987). When analysing the data, Magnusson, Krajcik, and Borko's (1999) model of PCK and the 2017 Refined consensus model of PCK (Carlson, Daehler, et al., in press) was used. Empirical data was collected by video- and audio recorded lessons, coreflection sessions, coplanning sessions and interviews. During 10 weeks, about 28 hours of video and audio recordings was collected. Selected parts of the material were transcribed and analysed in order to answer two questions: (1) How can chemistry teachers refine their PCK when coteaching together with senior students in an Upper secondary science class? (2) How do Upper secondary senior student coteachers' conceptual knowledge of representations and chemical bonding shape a teacher's foundation of personal PCK (pPCK) when teaching chemical bonding in an Upper secondary science class? The results relating to research question one indicates that the coteachers contributed with their own learning experiences to help the teacher understand how students perceive difficult concepts. The coteachers were mediating between the teacher and the students, thus bridging the gap between the

teacher and the students' frames of references. The experienced chemistry teacher improved her understanding of students' thinking about themselves as learners of chemical bonding. Regarding the second research question, the findings showed that the creative process of reconstructing concepts of chemical bonding in the coplanning sessions meant that these were a useful tool for developing new teaching strategies and to further develop representations such as drama to illustrate chemical bonding. Together, the teacher and student coteachers, constructed a new representation that better illustrated polar covalent bonding. Taken together, these results provide important insights into how the chemistry teacher's pPCK was refined and how the coteachers contributed to improve instructional strategies.

Excerpt from A History of the Teaching of Chemistry in the Secondary Schools of the United States Previous to 1850 No less authority than Foster Watson is sponsor for the state ment that the history of the study of Latin is the history of secondary education well into the nineteenth century. We have long known in a general way, at least, the factors which delayed the introduction of the natural sciences, but we have been sadly lacking in information as to when and how the natural sciences began their invasion of the curriculum. Mr. Powers has made a valuable contribution not only to the history of the teaching of chemistry, but to the general history of education. He has presented in a clear and interesting manner the many factors which brought chemistry into the foreground of social and intellect'ual interests and finally secured for it a place in the schools. In addition to the valuable data which his painstaking efforts have brought together, he has made clear the sequence of forces which are universally at work in bringing about changes in school curricula, - namely, new social and industrial needs; quests for new knowledge to meet these needs; rise of a new science (in this case, chemistry); efforts to gain for the new science a place in the schools; establishment of a new study; sub sequent formalism and devitalization; efforts to rehumanize or revitalize the now thoroughly established and thoroughly re spectable study, by teaching it in close relation to such concrete problems as originally led to its introduction. From this sum mary statement it is evident that Mr. Powers' study, though treating only one school subject and that for a comparatively brief period, will provide students of the history of education and students of secondary education not only with an explanation of many conditions and factors in the present educational situation, but also with the basis of an illuminating chapter in educational and social philosophy. Fletcher harper swift. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of

such historical works.

Chemistry is a subject that has the power to engage and enthuse students but also to mystify and confound them. Effective chemistry teaching requires a strong foundation of subject knowledge and the ability to transform this into teachable content which is meaningful for students. Drawing on pedagogical principles and research into the difficulties that many students have when studying chemical concepts, this essential text presents the core ideas of chemistry to support new and trainee chemistry teachers, including non-specialists. The book focuses on the foundational ideas that are fundamental to and link topics across the discipline of chemistry and considers how these often complex notions can be effectively presented to students without compromising on scientific authenticity. Chapters cover: the nature of chemistry as a science the chemistry triplet substances and purity in chemistry the periodic table energy in chemistry and chemical bonding contextualising and integrating chemical knowledge Whilst there are a good many books describing chemistry and many others that offer general pedagogic guidance on teaching science, Foundations for Teaching Chemistry provides accounts of core chemical topics from a teaching perspective and offers new and experienced teachers support in developing their own 'chemical knowledge for teaching'.

Are you new to teaching chemistry? Possibly you have worked as a chemist and have decided to switch careers, desiring to pass on to others your love of the subject. Maybe you need ways of describing concepts that you yourself understand very well. There can often be a difference between knowing something and teaching it! Even if you are an established teacher of chemistry I hope that this work can be of benefit. It is always advantageous to have an extra description or analogy handy for those instances when you are faced with a few confused faces after presenting in a manner that usually gets the point across to most students. While in college I found it advantageous to dissect complicated material into more easily manageable components. I needed mental images and developed analogies in order to understand. Plenty of those tools which I used to learn chemistry found their way into my lectures when it was time to teach. Many students enjoyed, and found advantageous, lecture descriptions that differed from that which they read in their textbooks. I tweaked these devices over 20 years as I became more aware of student preparation and misconceptions. I make no references regarding pedagogical research or "best practice". I offer simply a good review of content, accompanied by comments regarding presentation, mental imagery, analogies, common student errors and misconceptions. In other words I attempt to make you aware of "things that worked for me". While writing this book I could not comprehend a way to discuss methods without first describing content. I have endeavored to describe these concepts in the same way I do in the classroom. This is not meant to insult your intelligence. For those who need it, this may serve as a decent basis of review. It is hoped that you will use some of my descriptions to complement what already works for you in your

classroom.

Enhance your teaching with expert advice and support for Key Stages 3 and 4 Biology from the Teaching Secondary series - the trusted teacher's guide for NQTs, non-specialists and experienced teachers. Written in association with ASE, this updated edition provides best practice teaching strategies from academic experts and practising teachers. - Refresh your subject knowledge, whatever your level of expertise - Gain strategies for delivering the big ideas of science using suggested teaching sequences - Engage students and develop their understanding with practical activities for each topic - Enrich your lessons and extend knowledge beyond the curriculum with enhancement ideas - Improve key skills with opportunities to introduce mathematics and scientific literacy highlighted throughout - Support the use of technology with ideas for online tasks, video suggestions and guidance on using cutting-edge software - Place science in context; this book highlights where you can apply science theory to real-life scenarios, as well as how the content can be used to introduce different STEM careers Also available: Teaching Secondary Chemistry, Teaching Secondary Physics

This dissertation, "Productions of Materials for Teaching Chemistry in Secondary Schools: a Systems Approach" by Wai-keen, Paul, Lau, ???, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. DOI: 10.5353/th_b3195498 Subjects: Chemistry - Study and teaching (Secondary) Chemistry - Study and teaching (Secondary) - China - Hong Kong Education, Secondary - China - Hong Kong - Curricula Education, Secondary - Curricula

Enhance your teaching with expert advice and support for Key Stages 3 and 4 Physics from the Teaching Secondary series - the trusted teacher's guide for NQTs, non-specialists and experienced teachers. Written in association with ASE, this updated edition provides best practice teaching strategies from academic experts and practising teachers.

Appealing graphics boost students' interest and understanding of chemistry Chemistry--looking at what matter is made of and how it behaves, down to the subatomic level--comes alive with this new text. With enticing, full-color graphics and page layouts that draw students in, Chemistry provides a clear, sound basis of scientific knowledge. Besides presenting chemistry fundamentals, the text offers bonus features that dispel common myths and provide examples of connections between chemistry and the environment, technology, and consumer choices. It also presents real-life problems affecting the world and their chemistry-related solutions. In addition, Investigations and Express Labs give students added exposure to chapter concepts for greater comprehension. A perfect introduction to the field of chemistry. Lexile Level 880 Reading Level 3-4 Interest Level 6-12

Winner of the CHOICE Outstanding Academic Title 2017 Award This comprehensive collection of top-level contributions provides a thorough review of the vibrant field of chemistry education. Highly-experienced chemistry professors and education experts cover the latest developments in chemistry learning and teaching, as well as the pivotal role of chemistry for shaping a more sustainable future. Adopting a practice-oriented approach, the current challenges and opportunities posed by chemistry education are critically discussed, highlighting the pitfalls that can occur in teaching chemistry and how to circumvent them. The main topics discussed include best practices, project-based education, blended learning and the role of technology, including e-learning, and science visualization. Hands-on recommendations on how to optimally implement innovative strategies of teaching chemistry at university and high-school levels make this book an essential resource for anybody interested in either teaching or learning chemistry more effectively, from experience chemistry professors to secondary school teachers, from educators with no formal training in didactics to frustrated chemistry students.

Enhance your teaching with expert advice and support for Key Stages 3 and 4 Chemistry from the Teaching Secondary series - the trusted teacher's guide for NQTs, non-specialists and experienced teachers. Written in association with ASE, this updated edition provides best practice teaching strategies from academic experts and practising teachers. - Refresh your subject knowledge, whatever your level of expertise - Gain strategies for delivering the big ideas of science using suggested teaching sequences - Engage students and develop their understanding with practical activities for each topic - Enrich your lessons and extend knowledge beyond the curriculum with enhancement ideas - Improve key skills with opportunities to introduce mathematics and scientific literacy highlighted throughout - Support the use of technology with ideas for online tasks, video suggestions and guidance on using cutting-edge software - Place science in context; this book highlights where you can apply science theory to real-life scenarios, as well as how the content can be used to introduce different STEM careers Also available: Teaching Secondary Biology, Teaching Secondary Physics

Do you want to do more labs and activities but have little time and resources? Are you frustrated with traditional labs that are difficult for the average student to understand, time consuming to grade and stressful to complete in fifty minutes or less? Teacher friendly labs and activities meet the following criteria: Quick set up with flexibility of materials and equipment Minutes in chemical preparation time Cheap materials that are readily available Directions written with flexibility of materials Minimal safety concerns

Teaching Secondary Chemistry

This book focuses on developing and updating prospective and practicing chemistry teachers' pedagogical content knowledge. The 11 chapters of the book discuss the most essential theories from general and science education, and in the second part of

each of the chapters apply the theory to examples from the chemistry classroom. Key sentences, tasks for self-assessment, and suggestions for further reading are also included. The book is focused on many different issues a teacher of chemistry is concerned with. The chapters provide contemporary discussions of the chemistry curriculum, objectives and assessment, motivation, learning difficulties, linguistic issues, practical work, student active pedagogies, ICT, informal learning, continuous professional development, and teaching chemistry in developing environments. This book, with contributions from many of the world's top experts in chemistry education, is a major publication offering something that has not previously been available. Within this single volume, chemistry teachers, teacher educators, and prospective teachers will find information and advice relating to key issues in teaching (such as the curriculum, assessment and so forth), but contextualised in terms of the specifics of teaching and learning of chemistry, and drawing upon the extensive research in the field. Moreover, the book is written in a scholarly style with extensive citations to the literature, thus providing an excellent starting point for teachers and research students undertaking scholarly studies in chemistry education; whilst, at the same time, offering insight and practical advice to support the planning of effective chemistry teaching. This book should be considered essential reading for those preparing for chemistry teaching, and will be an important addition to the libraries of all concerned with chemical education. Dr Keith S. Taber (University of Cambridge; Editor: Chemistry Education Research and Practice) The highly regarded collection of authors in this book fills a critical void by providing an essential resource for teachers of chemistry to enhance pedagogical content knowledge for teaching modern chemistry. Through clever orchestration of examples and theory, and with carefully framed guiding questions, the book equips teachers to act on the relevance of essential chemistry knowledge to navigate such challenges as context, motivation to learn, thinking, activity, language, assessment, and maintaining professional expertise. If you are a secondary or post-secondary teacher of chemistry, this book will quickly become a favorite well-thumbed resource! Professor Hannah Sevian (University of Massachusetts Boston)

The fourth edition of Teaching Secondary Science has been fully updated and includes a wide range of new material. This invaluable resource offers a new collection of sample lesson plans and includes two new chapters covering effective e-learning and advice on supporting learners with English as a second language. It continues as a comprehensive guide for all aspects of science teaching, with a focus on understanding pupils' alternative frameworks of belief, the importance of developing or challenging them and the need to enable pupils to take ownership of scientific ideas. This new edition supports all aspects of teaching science in a stimulating environment, enabling pupils to understand their place in the world and look after it. Key features include: Illustrative and engaging lesson plans for use in the classroom Help for pupils to construct new scientific meanings M-level support materials Advice on teaching 'difficult ideas' in biology, chemistry, physics and earth sciences Education for sustainable development and understanding climate change Managing the science classroom and health and safety in the laboratory Support for talk for learning, and advice on numeracy in science New chapters on e-learning and supporting learners with English as a second language. Presenting an environmentally sustainable, global approach to science teaching, this book emphasises the

need to build on or challenge children's existing ideas so they better understand the world in which they live. Essential reading for all students and practising science teachers, this invaluable book will support those undertaking secondary science PGCE, school-based routes into teaching and those studying at Masters level.

Enhance your teaching with expert advice and support for Key Stages 3 and 4 Physics from the Teaching Secondary series - the trusted teacher's guide for NQTs, non-specialists and experienced teachers. Written in association with ASE, this updated edition provides best practice teaching strategies from academic experts and practising teachers. - Refresh your subject knowledge, whatever your level of expertise - Gain strategies for delivering the big ideas of science using suggested teaching sequences - Engage students and develop their understanding with practical activities for each topic - Enrich your lessons and extend knowledge beyond the curriculum with enhancement ideas - Improve key skills with opportunities to introduce mathematics and scientific literacy highlighted throughout - Support the use of technology with ideas for online tasks, video suggestions and guidance on using cutting-edge software - Place science in context; this book highlights where you can apply science theory to real-life scenarios, as well as how the content can be used to introduce different STEM careers Also available: Teaching Secondary Chemistry, Teaching Secondary Biology

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