

Understanding and Developing Science Teachers' Pedagogical Content Knowledge

John Loughran, Amanda Berry and Pamela Mulhall



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Understanding And Developing Science Teachers Pedagogical Content Knowledge:

Understanding and Developing Science Teachers' Pedagogical Content Knowledge J. John Loughran, Amanda Berry, Pamala Mulhall, 2012-01-01 There has been a growing interest in the notion of a scholarship of teaching. Such scholarship is displayed through a teacher's grasp of and response to the relationships between knowledge of content teaching and learning in ways that attest to practice as being complex and interwoven. Yet attempting to capture teachers' professional knowledge is difficult because the critical links between practice and knowledge for many teachers is tacit.

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Understanding and Developing Science Teachers' Pedagogical Content Knowledge John Loughran, Amanda Berry, Pamela Mulhall, 2012-07-31 There has been a growing interest in the notion of a scholarship of teaching. Such scholarship is displayed through a teacher's grasp of and response to the relationships between knowledge of content teaching and learning in ways that attest to practice as being complex and interwoven. Yet attempting to capture teachers' professional knowledge is difficult because the critical links between practice and knowledge for many teachers is tacit. Pedagogical Content Knowledge (PCK) offers one way of capturing, articulating and portraying an aspect of the scholarship of teaching and in this case the scholarship of science teaching. The research underpinning the approach developed by Loughran, Berry and Mulhall offers access to the development of the professional knowledge of science teaching in a form that offers new ways of sharing and disseminating this knowledge. Through this Resource Folio approach comprising CoRe and PaP eRs, a recognition of the value of the specialist knowledge and skills of

science teaching is not only highlighted but also enhanced The CoRe and PaP eRs methodology offers an exciting new way of capturing and portraying science teachers pedagogical content knowledge so that it might be better understood and valued within the profession This book is a concrete example of the nature of scholarship in science teaching that is meaningful useful and immediately applicable in the work of all science teachers preservice in service and science teacher educators It is an excellent resource for science teachers as well as a guiding text for teacher education Understanding teachers professional knowledge is critical to our efforts to promote quality classroom practice While PCK offers such a lens the construct is abstract In this book the authors have found an interesting and engaging way of making science teachers PCK concrete useable and meaningful for researchers and teachers alike It offers a new and exciting way of understanding the importance of PCK in shaping and improving science teaching and learning Professor Julie Gess Newsome Dean of the Graduate School of Education Willamette University This book contributes to establishing CoRes and PaP eRs as immensely valuable tools to illuminate and describe PCK The text provides concrete examples of CoRes and PaP eRs completed in real life teaching situations that make stimulating reading The authors show practitioners and researchers alike how this approach can develop high quality science teaching Dr Vanessa Kind Director Science Learning Centre North East School of Education Durham University

A Study of the Pedagogical Content Knowledge of Science Teachers Fouad Sami Abd el Khalick, 1995 The purpose of this study was to describe the pedagogical content knowledge of a group of science teachers Pedagogical content knowledge was characterized in terms of the teachers knowledge of the structure function and development of their disciplines biology chemistry and physics and their understanding of the nature of science Pedagogical content knowledge was then related to the teachers level of education years of teaching experience and the class levels that they teach Twenty science teachers were selected using purposive sampling procedures to participate in the study However seventeen teachers completed all phases of this study Teachers responded to a modified version of the Views on Science Technology Society questionnaire to assess their understanding of the nature of science They then constructed concept maps that were used to assess knowledge of the structure of their disciplines Finally they were interviewed to assess their understanding of the function and development of their disciplines Responses to the questionnaire were categorized as reflecting idealistic or realistic views of the nature of science The concept maps were scored on their validity congruence salience and centrality of concepts A wholistic score was also derived for the concept maps Clinical interviews were audio tape recorded and transcribed then analyzed to assess teachers understanding of the function of their disciplines in terms of the number of everyday life examples that they could provide In these interviews knowledge of the development of science was also assessed by first asking teachers to adapt their concept maps to the needs of younger students then to explicate their knowledge of their students alternative conceptions The pedagogical content knowledge of the teachers who participated in this study was lacking in all respects Teachers held several idealistic views about the nature of science and

did not demonstrate adequate understandings of the structure function and development of their disciplines Moreover teachers pedagogical content knowledge did not relate to their years of teaching experience the class level s that they teach and their level of education These results were discussed It was reasoned that teacher preparation programs are not helping student teachers to develop their pedagogical content knowledge Recommendations for improving teacher education programs to help science teachers develop this pedagogical content knowledge as well as recommendations for further research were presented *Journal of Technology Education* ,2012 Understanding and developing science teacher's John Loughran,2006 *Proceedings of the National Science Council, Republic of China* ,2000 Understanding Science Teachers' Professional Knowledge Growth Michel Grangeat,2015-12-09 Science education has to be improved in order to become more responsive to the needs of society confronted with a rapidly changing world Bringing science teaching up to a higher level is a key factor in this endeavour The authors of this book think about teachers as part of the immediate and large communities and systems in which they function They consider the development of teachers professional knowledge as a continuous process that depends on the communities they are committed to and participate in the discipline they are teaching the social context in which they perform the instruments made available in their environment and their day to day classroom experience From this perspective each teacher learns in an individual way but cannot learn without relying on their colleagues and other partners Such professional knowledge is partly tacit and explicit and thus possessed by teachers experts and researchers Coordinating activity theory and models of pedagogical content knowledge PCK the book provides a better understanding of the growth of science teacher professional knowledge The chapters are organised around shared perspectives and themes and based on research findings The emerging model can inform pre service teacher educators researchers and students The book results from exchanges and symposia during international conferences ECER ESERA and from a two day seminar held at Universit Grenoble Alpes in March 2015 **Learning Science Teaching: Developing A Professional Knowledge Base** Bishop, Keith,Denley, Paul,2007-11-01 The book argues that highly accomplished science teachers are also continually learning science teachers It stresses the importance of learning through others by participation in communities of science practitioners as well as individual learning through classroom research The Interaction of Michigan Environmental Education Curriculum, Science Teachers' Pedagogical Content Knowledge, and Environmental Action Competence Angelita Panton Alvarado,2010 Imagining a Renaissance in Teacher Education Cheryl J. Craig,Louise F. Deretchin,2008 Imagining a Renaissance Teacher in Education encompasses a wide swath of topics ranging from the need to discuss the psychic rewards ofteaching and adding care to the vision of education to the revamping of particular courses and apprising student teachers of their legal rights before placing them in schools With chapters written by internationally acclaimed teacher educators and with the voices of teachers children and principals are threaded throughtout this book offers principles of teacher education practice that have been gleaned over time from an international meta analysis

Handbook of Research on Science Teaching and Learning Dorothy Gabel, 1994 Sponsored by the National Science Teachers Association this handbook provides a uniquely comprehensive and current survey of the best research in science education compiled by the most renowned researchers More than summaries of findings the content provides an assessment of the significance of research evaluates new developments and examines current conflicts controversies and issues in the major science disciplines biology chemistry physics and earth science *Science Teachers Association of Nigeria* Science Teachers Association of Nigeria. Annual Conference, 2002* Teachers' Scientific Knowledge, Teaching Practice, and Students' Learning Activities Shinho Jang, 2004 **Science Teachers' Learning** National Academies of Sciences, Engineering, and Medicine, Division of Behavioral and Social Sciences and Education, Teacher Advisory Council, Board on Science Education, Committee on Strengthening Science Education through a Teacher Learning Continuum, 2015-12-15

Currently many states are adopting the Next Generation Science Standards NGSS or are revising their own state standards in ways that reflect the NGSS For students and schools the implementation of any science standards rests with teachers For those teachers an evolving understanding about how best to teach science represents a significant transition in the way science is currently taught in most classrooms and it will require most science teachers to change how they teach That change will require learning opportunities for teachers that reinforce and expand their knowledge of the major ideas and concepts in science their familiarity with a range of instructional strategies and the skills to implement those strategies in the classroom Providing these kinds of learning opportunities in turn will require profound changes to current approaches to supporting teachers learning across their careers from their initial training to continuing professional development A teacher's capability to improve students scientific understanding is heavily influenced by the school and district in which they work the community in which the school is located and the larger professional communities to which they belong Science Teachers Learning provides guidance for schools and districts on how best to support teachers learning and how to implement successful programs for professional development This report makes actionable recommendations for science teachers learning that take a broad view of what is known about science education how and when teachers learn and education policies that directly and indirectly shape what teachers are able to learn and teach The challenge of developing the expertise teachers need to implement the NGSS presents an opportunity to rethink professional learning for science teachers Science Teachers Learning will be a valuable resource for classrooms departments schools districts and professional organizations as they move to new ways to teach science **Science Teachers' Knowledge Development** Jan H. van Driel, 2021-11-29 In this volume Jan van Driel presents an overview of his research on the professional knowledge that science teachers develop and enact in their teaching to promote student understanding and engagement in science Using a selection of ten of his best publications van Driel explains his journey from a chemistry teacher to an international leader in research in science education He highlights collaborative projects with colleagues and students that have contributed to a

better understanding of the nature of science teachers professional knowledge and how it develops in the context of teacher education and reforms of science education He discusses the impact of this research on the international research community and on the practice and policy of science education **The ... Yearbook of the Association for the Education of Teachers in Science** ,1994 New Zealand Journal of Educational Studies ,2006 Developing Primary Science John Sharp,2004 This book helps trainee and qualified teachers in the UK to explore science education in greater depth and demonstrates how evidence based research actually informs classroom practice It provides strategies and activities to help deliver the curriculum and opportunities to reflect critically on practice through focused questioning *Beyond the Stereotype to New Trajectories in Science Teaching* Peter Okebukola,2002

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