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Reviews

Science Teacher Education: A Wonderful Journey Around the World

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S.K. Abell (Ed.). (2000).* Science Teacher Education: An International Perspective. *Boston: Kluwer Academic Publishers. ISBN 0-7923-0455-4.

In this highly readable book, Sandra Abell traverses more than a dozen countries and presents the work of 34 authors in a thorough discussion of the many complex aspects of science teacher education. The form of the book has made my task as reviewer both easier and more difficult: easier because there is a thematic coherence to the book; more difficult because the 34 different authors (11 chapters) have different voices and different perspectives to share with readers.

Science Teacher Education is divided into four sections. In the introduction (section 1), Abell identifies some themes that, despite differences of history, politics, and culture, are common to science education in all these countries. The four chapters in section 2 examine science teacher education programs in a number of countries, including Australia, Italy, Lebanon, and my own country—Pakistan. The third section of the book (chapters 6–8) discusses different aspects of innovative science teacher education programs in three countries: Israel, the United Kingdom, and the United States. The fourth section (chapters 9–11) could have been divided into two sub-sections. Chapters 9 and 10 describe some partnerships between the universities of the developed countries and the universities and schools of the developing world. The countries represented are Egypt, in the Middle East, and Bolivia, Chile, and Venezuela in South America. The final chapter attempts to synthesize the ideas that science teacher educators from a cross-section of six countries of the world hold about scientific literacy. What quickly becomes clear is that in all the countries represented there have been efforts to restructure and reform science education. Furthermore, all the authors featured in this volume agree that it takes time to become a teacher and that teachers are key to any reform effort.

In section 2, Appleton, Ginns, and Watters give a brief yet comprehensive history of changes in science teacher education programs in Australia. They document the shift from a one-year program to a four- or five-year teacher preparation program over the last three decades. There is a certain poignancy in the authors' admission that despite the achievements and successes of the past 30 years, efforts to enhance elementary teachers' confidence in their ability to teach science have not always borne fruit. The authors conjecture that something other than mere content knowledge may be at stake. They plead not only for more Australian but also for more international efforts at research in this area. In the following chapter, Borghi et al. present a brief and somewhat confusing account of science teacher education in Italy, using physics teacher education as a case. The confusion arises because the authors, while describing the current program, repeatedly allude to reforms that are *going to take place soon.* However, readers do get an understanding of how firmly embedded science teacher education is within the disciplinary departments. I wondered, as

I read, whether pedagogy is getting the attention it deserves in such a system. The system of teacher education in Lebanon (chapter 4) is complex and multi-layered; hence its description is also complex. However, in attempting an explanation, the author, BouJaoude, only adds to the complexity by characterizing the programs as academic, technical, or practical. One wonders what led the author to use these particular categories. Apart from a brief quotation, no rationale is presented.

The final chapter in this section was my initial motivation for reading the book—it discusses science teacher education in Pakistan. Iqbal and Mahmood first sketch out the history of science education in Pakistan, before going on to analyse at length the science teacher education system currently in place. They point out that there is a severe shortage of teachers educated in the discipline of science, particularly in rural areas. Hence, a large number of teachers who teach science have themselves never studied science. The authors lament that methods of science teacher education are very didactic and lecture-based and that newer approaches to teaching and learning based on constructivism have not yet made inroads into Pakistani science teaching or science teacher education. Since most teachers have been taught science by way of rote memorization, they continue to teach in this way, so that the cycle is continually repeated. Teacher education reforms in Pakistan are long overdue, and many efforts made by the government in this regard either are insufficient or have not been implemented.

However, Iqbal and Mahmood have kept their focus on teacher education in the public sector, neglecting to note that, since the 1980s, private investment in higher education has been strongly encouraged by the government. Since then, teacher education programs have thrived in the private sector. For instance, since 1994 the Institute of Educational Development of the Aga Khan University (AKU-IED),[1] Karachi (where I teach science methods and research methods courses), has had remarkable success in raising awareness among science teachers about the use of more 'hands-on, minds-on' methods of teaching science. More than 250 science teachers from all over Pakistan, and from eight other countries in the region, have taken part in the eight-week in-service Visiting Teacher Program. More than 80 teachers have completed their two-year Master's degree in Teacher Education from AKU-IED. It is these graduates who have made a remarkable shift in their ideas about teaching (Jaworski, 1996). Furthermore, the Ali Institute for Education offers a post-graduate one-year diploma program designed to train elementary teachers, and the Notre Dame Institute of Education, run by the Australian Sisters of Mercy, offers certificates, diplomas, and degrees in education. These institutions, though few and lacking the ability to affect the system as a whole, have made a difference (Halai, 1999; Kanu, 1996; Khamis, 2000). If Iqbal and Mahmood had also included the efforts of the private sector in their thorough review of teacher education in Pakistan, this would have expanded the scope of the review and would have allowed a glimmer of hope to illuminate an otherwise very difficult and depressing situation.

In reading the four chapters in section 2, I was struck by the difference in priorities for discussion between the two chapters from Pakistan and Lebanon and the two from Australia and Italy. The authors from Australia focus on the increase in preparation time (from one year to four or five years) and on the way in which theories of learning such as constructivism and the development of professional associations have influenced science teacher education reform. In Italy, the new reforms discuss ways and means of increasing the education of elementary science teachers to eight six-month periods. In stark contrast, reform efforts have not taken root in Pakistan. The government has lacked the political will to implement even those programs that have been planned and sanctioned by its own institutions. In Lebanon, several different models of teacher education programs exist—based on the American, the French, or the indigenous system. Most of them focus on theoretical rather than practical issues—they stress the technical aspects of education and neglect to take up more ethical components of the teaching-learning process. It seems that the problems of the 'haves' and the 'have-nots' are of a different nature. Pakistan (and, to a lesser extent, Lebanon) is still grappling with issues of a very basic nature, both qualitatively and quantitatively. How can all science teachers have access to some science course work before

teaching? How can the prerequisites for primary teacher education be increased to more than 10 years of schooling? The questions emanating from the developed countries are significantly different. How can science teaching be made inquiry-based? How can teachers' pedagogical content knowledge be enhanced? While there is some discussion of the similarities of problems in the different countries of the world, I wonder if space might also have been found for discussing the differences.

The third section of *Science Teacher Education* highlights research on student learning in teacher preparation programs. Weinberger and Zohar describe a course called *Thinking in Science* that is part of the preparation of science teacher educators in a university setting in Israel. Baird, Brodie, Bevins, and Christol examine current practices in teacher preparation and student teaching assessment in universities in the United States and United Kingdom and develop a model for student teacher assessment. However, *Thinking Like a Teacher* by Abell and Jacks is the chapter that made me sit up and take notice. Why is this chapter here? After reading the first few paragraphs, I thought that the chapter might discuss some aspects of Honduran science teacher education or the system of science teaching. Instead, it discusses the experiences of a novice American science teacher, Amy, during a three-week internship in a bilingual school in Honduras as part of a Study Abroad program of a university in the United States. Amy's story is poignant and refreshing. It tells of her experiences during the three weeks she spent in Honduras—ranging from discomfort in dealing with people from different socio-economic backgrounds to raising questions about "What is an American?" If this chapter encourages schools and faculties of education in the West to incorporate internships in developing countries into their programs, it will prove the most important chapter in this book. The gaps and schisms that exist between the North and the South could be bridged with more such programs.

This chapter also brings to the fore an important issue: 'Thinking like a teacher.' When does a teacher start thinking like one? It is an intriguing question. Amy claims that she 'became' a teacher when she was immersed in teaching in Honduras. It affected her subsequent teaching decisions, including her teaching of second- and fifth-grade Spanish in the United States. The immersion experience, it is believed, helps to *make the familiar strange* and challenges us to think about things in a new way. Abell and Jacks think that good professional programs also help to bring about this change. It is here that the student teacher stops looking at the world through the eyes of a student and begins thinking like a teacher.

The fourth and the last section of the book, 'Cross-Cultural Perspectives on Science Teacher Education,' includes a chapter by Koch and Barton in which they describe a meeting of two cultures when eight public school secondary science teachers from Egypt came to New York to study science education. The authors have used science autobiographies of three science teachers (two women, one man) to highlight the experiences of these Egyptian teachers during their stay in New York. The authors were not the architects of this project and are openly critical of the manner in which the project was conceptualized. They were appalled at the unspoken messages transmitted and at the "othering" of the teachers from a different context. The visiting teachers had no say in their program, not even in their placements. Despite their facility with English, they had to attend English classes. Despite their long experience of teaching, they were seen as learners who had to be taught basic aspects of teacher education. While this may seem a scathing commentary on the part played by the project directors, I am sad to report that it is quite a common occurrence in programs that claim a partnership relationship between institutions of the North and the South. Speaking from personal experience of partnership relationships between our university and several renowned universities in the United Kingdom, the United States, and Canada, I have learned that it takes time and commitment to build trust. Even then, one of the toughest lessons is that under the best of circumstances these partnerships have a tendency to be skewed and biased.

In Chapter 10, Pederson et al. continue to examine partnerships—in particular, three partnership projects in Bolivia, Chile, and Venezuela. The partnerships between Chile and East Carolina

University and between Venezuela and the University of Nebraska have made some headway, but the project in Bolivia has not yet reached the implementation stage. All three projects appear to be undergirded by the assumption that teacher educators and university teachers from North America will impart the 'right' training or education to those in South America. I wonder whether it is accurate to refer to these relationships as *partnerships* at all. It seems to me, as an academic living and working in a developing country, that *developmental aid* would be a more appropriate term.

The last chapter of *Science Teacher Education* is very thought provoking. Despite the avowed good intentions of science educators and science teachers to try to attain scientific literacy for all students, this is a concept that is hard to define. Tippins et al. interviewed six science educators from Guinea, South Korea, Japan, New Zealand, Austria, and Colombia with the help of open-ended questions, to elicit their conceptions of scientific literacy. It quickly becomes clear that conceptions of scientific literacy reflect the social, cultural, and political situations that shape the practice of people in specific countries. This finding challenges the hegemonic representations of scientific literacy promoted by academic journals published in the West.

The strength of this book lies in the fact that Abell has refused to make it into a compendium of science teacher education programs in different parts of the world. The different writing styles—from science autobiographies to a historical analysis of the growth in science teacher education—add considerably to its interest value. *Science Teacher Education* also demonstrates that Abell has a deep understanding of the 'cutting edge' in educational research. This collection of papers represents more than a dozen countries and 34 authors, and, although this is still only a small slice of the views, perspectives, and programs in science education worldwide, it is an enormously useful slice because it exposes us to pictures that otherwise we might never see.

Notes

1 The Aga Khan University was the first private university in Pakistan, chartered in 1983.

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