

Book review: Summing up mathematics teacher education

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Even, Ruhama, & Loewenberg Ball, Deborah (Eds.) (2009). *The Professional Education and Development of Teachers of Mathematics*, The 15th ICMI Study. New York: Springer. xii + 280 pp. Hardback ISBN: 978-0-387-09600-1; \$129 [for ICMI reduced price see <http://www.mathunion.org/index.php?id=801>]

Sullivan, Peter, & Wood, Terry (Eds.) (2008). *International Handbook of Mathematics Teacher Education*, Vol. 1: *Knowledge and beliefs in mathematics teaching and teaching development*. Rotterdam: Sense. 330 pp. Paperback ISBN: 978-90-8790-541-5, \$49; Hardback ISBN: 978-90-8790-542-2, \$99.

Tirosh, Dina, & Wood, Terry (Eds.) (2008). *International Handbook of Mathematics Teacher Education*, Vol. 2: *Tools and processes in mathematics teacher education*. Rotterdam: Sense. 364 pp. Paperback ISBN: 978-90-8790-544-6, \$49; Hardback ISBN: 978-90-8790-545-3, \$99.

Krainer, Konrad, & Wood, Terry (Eds.) (2008). *International Handbook of Mathematics Teacher Education*, Vol. 3: *Participants in mathematics teacher education: Individuals, teams, communities, and networks*. Rotterdam: Sense. 392 pp. Paperback ISBN: 978-90-8790-547-7, \$49; Hardback ISBN: 978-90-8790-548-4, \$99.

Jaworski, Barbara, & Wood, Terry (Eds.) (2008). *International Handbook of Mathematics Teacher Education*, Vol. 4: *The mathematics teacher educator as a developing professional*. Rotterdam: Sense. 372 pp. Paperback ISBN: 978-90-8790-550-7, \$49; Hardback ISBN: 978-90-8790-551-4, \$99.

This review examines two recent collective publications that set out to survey and synthesise knowledge in the field of mathematics teacher education. Both allude to the timeliness of such an enterprise given the growth and institutionalisation of research in this field since the early to mid 1990s. They feature an extensive (and often overlapping) authorship drawn from active researchers in the field. And both books incorporate some degree of invited comment (to which I shall make only sparing reference, although these contributions enrich appreciation of the contents).

The ICMI Study on the Professional Education and Development of Teachers of Mathematics

This volume was produced under the auspices of the International Commission on Mathematical Instruction [ICMI], and it forms part of the series of ICMI Studies. Each ICMI Study focuses on a topic of current significance in mathematics education.

The process starts with production of a Discussion Document by the organising team in which key issues and themes bearing on the topic are identified. This document is widely and freely circulated, and invites submissions addressing these issues and themes. On the basis of the submissions received, invitations are issued to participate in a Study Conference that provides a working forum in which the topic is explored. Finally, drawing on the discussion document, as well as the submissions to, and discussions at, the conference, a Study Volume is prepared for publication with the intention of promoting and assisting discussion and action in the field (ICMI, 2008).

The specific aims of this Study on *The Professional Education and Development of Teachers of Mathematics* were “to investigate practices and programs of mathematics teacher education in different countries and to contribute to an international discourse about the professional education of prospective and practicing teachers of mathematics” (p. 1). The study volume has two main sections, focusing on *Initial Mathematics Teacher Education* and *Learning in and from Practice*, respectively. However, because the final theme within the first section, *Mathematics Educators’ Activities and Knowledge*, is a distinct one that addresses cross-cutting issues, I will give separate attention to it. A short final section of the study volume examines *Key Issues for Research in the Education and Professional Development of Teachers*.

Initial Mathematics Teacher Education

The first theme in this section is *The Preparation of Teachers*. It opens with a brief overview of teacher education systems across the world [1.1.1] that finds great diversity and complexity; and these words echo through many other contributions to the book. This and the following chapter on components of mathematics teacher training [1.1.2] introduce a concern with establishing sound balance and productive relations between mathematical content, general pedagogy, mathematical pedagogy (or didactics), and practicum experience. A chapter presenting an eclectic collection of examples from teacher education practice [1.1.3] is followed by one on “expanding the role of practicum as an integrated part of a teacher education programme” [1.1.4] which returns to the components noted above and broaches an issue that pervades the remainder of the book: how to strengthen connections between the more decontextualised scholarly knowledge of content, pedagogy and didactics cultivated within teacher education institutions and “enacted knowledge in classroom settings” (p. 61). The second theme in this section is *Student Teachers’ Experiences and Early Years of Teaching*. It expands on the issues raised under the first theme through examining preservice teachers’ perceptions of mathematics and of their teaching role [1.2.1], their perceptions of disconnection between university coursework and school experience [1.2.2], and the epistemological, institutional and personal aspects of transition from being a student in the academy to being a teacher in the school [1.2.3].

Learning in and from Practice

This second section of the study volume opens with a chapter [2.1] which develops a perspective in which “teacher beliefs, backgrounds, and positionings are identified as phenomena that must be interpreted and addressed, simultaneously, at personal, social, and cultural levels” (p. 150). It embraces “a way of thinking about professional

development in which... teachers share thoughts and practices rather than a particular way of doing things”, so that “teachers learn, and those who teach teachers learn correspondingly” (p. 165). Such a perspective is elaborated further in the following chapter [2.2], first in theoretical terms, and then through examining various professional development models that involve learning in and from practice, singling out (several forms of) lesson study as representing “one community of practice model that has been influential beyond its original geographical location and cultural context” (p. 176). A further chapter [2.3] considers the contribution of different types of mathematically related tasks and teacher learning communities as tools and settings to support learning in and from practice. One of the commentaries on this section as a whole highlights a rather unquestioning commitment to notions of “community of practice” and “learning as participation”, and a lack of precision in the use of these constructs as analytic tools. Equally, this commentary questions whether such models are sufficiently powerful to address all aspects of professional learning (pp. 227-228). The final chapter in this section, on “the balance of teacher knowledge” [2.4], is written from a more objectivist perspective, arguing that “emerging research on the relationship between teachers’ content knowledge and pedagogical practices is promising”, and that “teachers can learn [pedagogical content knowledge] in and from practice” (p. 220).

Mathematics Educators’ Activities and Knowledge

The study volume specifically addresses the teacher educator role in the third theme of its first section. One chapter [1.3.4] takes up an aspect that seems of particular relevance to ICMI, examining the scope for collaboration between academic mathematicians and mathematics educators in teacher education activities. However, the focus of earlier chapters is firmly on the university-based teacher educator. Indeed, little attention is given to those outside higher education who support teacher development. The chapter on becoming a teacher educator [1.3.2] illustrates this when it talks of people:

becom[ing] teacher educators after having worked as Local Authority consultants providing professional development courses and advice to teachers in schools [or]... hav[ing] worked with student teachers... by mentoring them during their school placements. (p. 114)

The endpiece of the study volume construes this as a “problem of conceptual diffusion” whereby “no single word or phrase exists to describe the professionals who work with teachers”, and proposes that “teacher developer” be employed as a broader term (pp. 256-257).

The opening chapter on this theme [1.3.1] suggests that teacher educators require the capacity to engage teachers in tasks that focus their attention on managing student learning, showing sensitivity to students, and sustaining intellectual challenge; equally, teacher educators must themselves discharge these responsibilities within the teacher education process. These qualities would seem important for all teacher developers whether they be school-, district-, or university-based. However, a distinctive expectation of university-based teacher educators is generally that they be active in research, even if recruited without significant relevant training or experience [1.3.2]. A survey has suggested that mathematics teacher education research is predominantly small-scale and qualitative, and mostly conducted by

teacher educators studying the teachers with whom they are working [3.3]. This phenomenon is examined in more detail in a chapter on “educators reflecting on (researching) their own practice” [1.3.3] which proposes that such studies serve as an important means of professional learning for the teacher educators concerned. Nevertheless, one of the commentaries on this theme points to a danger of studies of this type taking too much for granted, and a later commentary alludes, moreover, to tensions experienced by university-based teacher educators between academic rigour and professional empathy. Indeed, this commentary suggests that the study volume may be “missing [a] dimension of the conference” (p. 232); specifically, the issues of emotion, power, trust and respect that figure prominently in “the lived experiences of the participants” (p. 234).

Key Issues for Research

This final section of the study volume contains three brief contributions. The first offers “some reflections on education, mathematics and mathematics education” [3.1] framed in rather personal and general terms. The other contributions make cases for developing deeper understanding of practice-based professional development [3.2], and for encouraging larger-scale, longer-term, and more reflexive research studies that address a comprehensive range of themes [3.3]. Altogether, though, this section is so short that it provides little scope to examine the theme in depth or to develop a larger perspective on it.

In summary, then, this volume is of interest as a mosaic of current thought and practice amongst those active in the professional education and development of mathematics teachers. The ICMI Study appears to have succeeded in its aim “to be as inclusive as possible and to give a voice to all interested conference participants” (p. 8). However, this has limited the degree to which ideas and arguments are developed in depth within the study volume. Some chapters incorporate fragments from very large numbers of contributing authors, and there is also some repetition between chapters, particularly where different authorial teams have been enthused by the same conference contributions. In the words of one of the invited commentaries included in the book, the volume is “a smorgasbord of information, practices and trends” that often relies “heavily on information supplied by those who attended the special study”, although “reference is also made to sources from the field more broadly” (p. 135).

The International Handbook of Mathematics Teacher Education

The International Handbook of Mathematics Teacher Education [henceforth, IHMTE] is described as addressing the “what”, the “how”, and the “who” of mathematics teacher education. This is tackled through four distinct volumes on, respectively, *Knowledge and Beliefs in Mathematics Teaching and Teaching Development*, *Tools and Processes in Mathematics Teacher Education*, *Participants in Mathematics Teacher Education* at the levels of *Individuals, Teams, Communities and Networks*, and *The Mathematics Teacher Educator as a Developing Professional*. Compared to the multivocal syntheses of the ICMI study volume, the chapters of IHMTE are more conventionally authored, and generally longer with more extensive referencing of other literature. In many of the chapters, this greater length permits more expansive examination of conceptual frameworks and practical examples.

Knowledge and Beliefs in Mathematics Teaching and Teaching Development

In the first IHTME volume, ‘knowledge’ receives more attention than ‘beliefs’: the latter is the central concern of only one chapter [1.8] which provides a systematic but dense synthesis of research. For the ‘knowledge’ theme, the construct of pedagogical content knowledge provides an important common point of reference. Nevertheless the chapter with that very title [1.5] adds the subtitle “useful concept or elusive notion” which aptly captures the tenor of discussion throughout the volume. In effect, the term has become a widely used marker for the idea that there is a broader subject knowledge distinctive to teaching, but it is used with considerable elasticity beyond that. As well as describing a variety of ways in which the construct of pedagogical content knowledge has been operationalised in relation to mathematics, the chapter dealing directly with it [1.5] reviews a range of critiques and proposes directions for future research: the emphasis is on validating, prioritising, and operationalising uses of the construct for practical action. A later chapter [1.9] deploys the ideas of institutional “mathematical organisation” (p. 198) and structured “pedagogic discourse” (p. 208) to highlight how the now commonplace distinction between subject matter knowledge and pedagogical content knowledge overlooks “the social production of mathematics for teaching” (p. 195).

Both chapters on Western teacher education problematise the construct of pedagogical content knowledge. The chapter on primary teaching [1.1] argues that “trying to draw distinctions between content knowledge and pedagogical content knowledge may no longer be helpful”, suggesting that greater emphasis be placed on “helping teachers develop a certain mathematical sensibility” (p. 13). More indirectly displaying a similar stance, the chapter on secondary teaching [1.4] places greater emphasis on knowledge concerning mathematical investigation, modelling and problem-solving, and the still unfolding development of disciplinary mathematics. In effect, both chapters are arguing for the importance of teachers knowing how to learn mathematics and engage in its various forms (pp. 22, 105). The parallel chapters on East Asian teacher education suggest a trend to develop broader and more integrated subject knowledge. At primary level [1.2], in (Mainland) China there is a concern “to help prospective teachers connect their mathematics learning with current elementary mathematics curriculum reform and instruction” (p. 57); in (South) Korea “[to design] mathematics content courses [that] help prospective teachers deepen their

understanding of mathematics content taught in elementary school, and to foster their pedagogical content knowledge” (p. 58). Likewise at secondary level [1.3], while “Korean innovative courses attempt to adopt an integrated approach to connect subject knowledge and pedagogy pertaining to the learning of specific mathematics content” (p. 83), in China mathematicians “leave the responsibility of connecting higher mathematics to elementary mathematics, and ... of providing high quality mathematics pedagogical knowledge [to] mathematics educators” (p. 83).

Other chapters in this first IHMTE volume focus on tools that afford more fine-grained analysis of mathematical knowledge in and for teaching. A chapter on “developing knowledge for enacting curriculum” [1.6] analyses, in relation to a specific mathematical topic, “the kinds of knowledge which a teacher might draw on when being a curriculum maker, and some of the constraints which may prevent a teacher from fully enacting this role” (p. 133). Likewise, a chapter on “learning to design for learning” [1.7] offers a detailed analysis of the unfolding development of knowledge for teaching within a particular sequence of “learning study”, a hybrid of lesson study and design research. A further chapter examines “cultural analysis of the content to be taught” [1.10], described as being concerned with “its possible different axiomatic organisations, its relevance in mathematics, its links with other subjects” (p. 225). Case studies from primary and secondary teacher education in differing educational systems underpin a chapter on assessment of mathematical knowledge of prospective teachers [1.11]. A final chapter on researching teachers’ mathematics disciplinary knowledge [1.12] describes the development of a grounded theorisation of mathematical knowledge in teaching practice, and ways in which the resulting model, The Knowledge Quartet, is being used within teacher education to analyse, improve and evaluate mathematics teaching.

In summary, then, it appears that the construct of pedagogical content knowledge has been valuable in scaffolding several lines of research that look more closely at the nuance of mathematical knowledge in the practice of teaching and teacher education. However, as these lines develop, the construct of pedagogical content knowledge ought to fade in favour of a more grounded and expanded theorisation of mathematical knowledge in practice.

Tools and Processes in Mathematics Teacher Education

The tools discussed towards the end of the first volume of IHMTE might well have found a place in the second volume specifically devoted to *Tools and Processes in Mathematics Teacher Education*. Here, it is particularly important to ask what ‘additionality’ there may be to the use of tools and processes within teacher education by virtue of their raising broader issues of mathematics teaching in an exemplary way. For example, manipulatives are widely used in mathematics teaching, and it is clearly important that teachers learn how they may be used productively. However, what particularly justifies a chapter on manipulatives as tools in teacher education [2.7] is a carefully grounded argument that they provide a fertile medium through which the inadequacies of a “copy-theory point of view” (p. 161) on mathematical knowledge can be established and some complexities of managing knowledge construction in the classroom recognised.

Chapter [2.6] focuses on “examples that are tools for examining basic assumptions that guide mathematical activity” (p. 137). The challenge here is to identify how the use of such examples differs between teacher education and mathematics teaching more broadly. The claims that they “exemplify processes ... that have become automated within conventional experiences”, and “exemplify issues of difficulty for students by having teachers examine their personal pitfalls in working with unconventional structures” (p. 153) are not really pursued in depth. Likewise, amongst the declared purposes of “using classroom tasks to prompt teacher learning” [2.5], only “to inform [teachers] about the range and purpose of possible classroom tasks” and “to stimulate and inform teachers’ theorising about students’ learning” (p. 110) appear distinctive to teacher education, although the later process of “converting tasks to lessons” (p. 113) is very much so: in this chapter, it is the analytic frames employed, such as the five-stranded model of mathematical proficiency (p. 112), or the heuristics of “comparing affordances and constraints of classroom tasks” (p. 116) or “comparing and adapting textbook exercises” (p. 121), that appear to be the tools distinctive to teacher education, rather than the classroom tasks themselves.

As chapter [2.2] reminds us, there is a long history of pedagogically-motivated case study, providing analytic frameworks that can be adapted to the particular circumstances of mathematics teacher education, and that are shown to underpin the examples discussed. Likewise, longstanding East Asian experience of lesson study and its more recent cultural transposition have created fertile conditions for the development of analytic frameworks and elicitation of craft knowledge contributing to effective use of a deceptively simple technique [2.4]. A chapter on the relatively undeveloped area of teachers’ narratives [2.1] proposes a taxonomy of educative processes that can be organised around the production of, and reflection on, such narratives. Chapter [2.3] on the better established area of video recordings as pedagogical tools identifies plausible general affordances for teacher education, and surveys some significant exemplars that illustrate various forms of use. A chapter on mathematical machines [2.8] discusses their affordances in rather general terms, giving less explicit attention to any distinctive and exemplary contribution within teacher education.

The final group of chapters in this second volume of IHMTE examines processes and outcomes of research in mathematics education in terms of their functionality as tools for teacher education. A chapter on using theories as tools [2.9] makes a plausible case for the heuristic value of two relatively simple theorisations of aspects of mathematical knowledge and thinking. The broader pedagogical argument, however, is that analysis of (what might otherwise appear to be inexplicable) mathematical errors in these relatively accessible terms (thus justifying the choice of some theories over others) “promoted prospective teachers’ ability to address possible reasons for students’ solutions”, which they could draw upon “in their design of future instruction” (p. 222). Similarly, chapter [2.10] reports on work in which teacher development took the form not only of terms of teachers using research-based knowledge of specific growth points in early mathematics learning to inform their planning, but more broadly of their refocusing on individual children’s understanding, and seeking to challenge and extend children’s thinking. Indeed, it is broader outcomes of these types that are also highlighted in chapter [2.11] on “learning to listen to children’s mathematics”. Thus it seems that the overarching contribution to teacher education of research-based frameworks for analysing students’ mathematical

thinking and learning is in catalysing broader shifts of teaching approach and attention, and in developing new capacities for response. The last chapter in this group moves beyond research on students' mathematical thinking to consider a theory of mathematical instruction [2.12], but it offers only a brief discussion of issues of teacher education.

In summary, then, not just this volume but the two neighbouring ones testify to the variety of tools and processes capable of contributing to mathematics teacher education and development. While one of the commentaries [2.14] notes the need to think in terms of "the entire collection of tools that mathematics teacher educators might bring to bear in their work", it argues that "one needs first and foremost a theory of proficiency in teaching mathematics that could be used to guide the selection and use of tools for mathematics teacher education" (p. 321). What is missing in this volume, then, is attention to more overarching models of the role of resources in teaching and teacher education, their organisation into a coherent functional system, and their broader educative (as well as pedagogical) value for teachers and teacher educators (Adler, 2000; Gueudet & Trouche, 2009; Remillard, 2005).

Participants in Mathematics Teacher Education: Individuals, Teams, Communities and Networks

The third volume of IHMTE focuses on *Participants in Mathematics Teacher Education*. The subtitle, *Individuals, Teams, Communities and Networks*, signals the distinction between different levels and types of organisation within the profession that guides the structuring of the volume. A 'team' is an institutionally managed grouping formed by official assignment; a 'community' is a self-directed grouping formed through personal identification with some collective enterprise; a 'network' is a loose informal grouping, functioning primarily as a mechanism for information exchange. The introduction to the volume explains that this framework was chosen to redress a tendency for research papers in mathematics teacher education to emphasise content. While the framework certainly acknowledges some important organisational aspects of professional activity, it presents difficulties as a structure for synthesising a body of research in which such aspects have not figured prominently in the conceptualisation and design of studies.

One might expect this not to pose particular difficulties as regards the 'individual' participant, given the prevalence of the teacher case study as a genre, and the frequency with which data is collected at the level of the teacher in other types of study. Even so, a comment in the first chapter [3.1] under this head (probably referring to studies of the latter type) is that "quite often [studies] do not target the individual with great depth" (p. 14). Thus, even here, the choice of this framework may have increased the challenge of synthesising existing research. The other chapter under this head [3.2] observes that "this review of literature shows how difficult it is to organize the variety of results and develop some conceptualisation" (p. 53). Difficulties in applying the overarching framework emerge more strongly in the two chapters on teams of teachers. The chapter on prospective teachers [3.3] reviews studies where some form of team organisation was in evidence (even if only their grouping as a class). However, it seems that this was largely incidental to the

conceptualisation of the studies surveyed. Indeed, the studies chosen overlap with those reviewed in the earlier chapter on individual teachers. Consequently, the construct of team plays no part in any of the themes identified, save a marginal presence in the last one, “difficulties of becoming a member of a community of practice”, where there is an aside that prospective teachers “may find that they are simultaneously *members of different teams* in the different courses that they attend” (p. 68). In the chapter on practising teachers [3.4], the team aspect does appear to be stronger in some of the forms of professional development being discussed. But, again, this aspect does not seem to have been a focus of many of the studies involved, resulting in only brief discussion of the role and functioning of teams. Effectively, then, each of these first four chapters develops its own synthesis of a selection of studies, each taking up its own emergent, cross-cutting themes.

Rather than employing literature review and synthesis, the two chapters on face-to-face communities proceed through analysis of particular cases. A chapter on prospective teachers [3.5] looks at learning communities established to prepare for an examination for teacher selection, to gain experience of school organisation, to support undergraduate subject study, as part of a graduate programme, and around a research project. Chapter [3.6] on practising teachers presents a number of communities and networks more briefly, before examining factors which foster their sustainability. Likewise, the next two chapters on virtual communities focus primarily on selected cases. A chapter relating to prospective teachers [3.7] opens with a synthesis of thinking about the mediating role of communication technologies in virtual communities. These ideas are taken up in the subsequent discussion of examples, alongside examination of other aspects of mediation. Chapter [3.8] on practising teachers describes and compares experiences from Brazil and Canada, involving somewhat different media and approaches.

The ensuing chapters on institutional development make connections with substantial bodies of theory and research developed outside mathematics education. A chapter on school development [3.9] examines how conceptual frameworks concerning organisational learning and professional communities can be used to analyse approaches to supporting and improving the teaching and learning of mathematics. A chapter on district development [3.10] focuses explicitly on improvement “at scale”. It identifies and examines structures that might support such development: including teacher networks, shared instructional vision, and relations of accountability and assistance. At the apex of this pyramid of scale and structure is a chapter on regional and national reform initiatives [3.11]. Taking four examples of large-scale projects from different continents, this chapter identifies three common elements apparently crucial to success: *collaboration* between stakeholder groups; open *communication* taking a variety of forms; and a *partnership* approach in which teachers are treated not just as participants but as collaborators and experts.

The last three substantive chapters of this volume might equally have featured in the volume on tools and processes; they examine particular forms of developmental activity in the form of action research [3.12], inquiry communities [3.13], and around records of practice [3.14].

In summary, then, the conceptual framework chosen to structure this volume was not well matched to those employed in the research studies surveyed in the earlier

chapters. Later chapters avoided such difficulties by focusing more on selected cases, or at a more theoretical level. Equally, this framework, like many of the other systems of constructs which emerged from the literature reviews reported in the earlier chapters, is a very generic one. Can it generate significant insights which go beyond general patterns and processes established by wider research on teacher education and development? How might it be refined to capture aspects and nuances distinctive to mathematics education?

The Mathematics Teacher Educator as a Developing Professional

The introduction to the final volume of IHMTE on *The Mathematics Teacher Educator as a Developing Professional* observes that research on mathematics teacher education has produced only “a very few papers [that] reflect critically on the teacher education process [and] on what teacher educators themselves learn from engaging in teacher education” (p. 3). Indeed, a later chapter on “mathematics teacher educators’ learning from research on their instructional practices” [4.6] examines the characteristics of such research, advocating that “an explicit goal of mathematics teacher educators’ research of their practice should be self-understanding and professional development” (p. 132). The introduction to the volume continues: “and even fewer papers report on the learning of the teacher educator or on programmes designed to educate educators. Authors in this last category are highly represented in this volume” (p. 3). Many of the chapters have a strongly personal voice. In particular, the second section consists of *Reflections on Developing as a Mathematics Teacher Educator* [4.7-4.10] solicited from four teacher educators, all university-based, working in different countries. It is intriguing to see how these authors have approached the task of constructing a professional autobiography.

Voice is also strong in the section on *Challenges to and Theory in Mathematics Teacher Education* because of the way in which many chapters express particular professional and intellectual identities. Problematizing current reform efforts, the first contribution [4.1] suggests that they are impeded by inadequacies in the existing knowledge base. In particular, a substantive reconceptualisation of mathematics teaching is required, taking the profession beyond simple rejection of existing models of teaching in the face of new views of learning. Two chapters seek to extend models of how teachers might induce change in students’ activity, to cover the analogous situation of teacher educators trying to induce change in teachers’ activity. One chapter [4.2] argues that while “educating teachers is about directing attention to practices and choices, constructs and theories which can inform choices when teaching”, it must also be made clear “that there is no assumption that the teacher educator ‘knows’ what the teacher needs to become aware of, for most often what practitioners need ... are prompts which provoke them to become explicitly aware of what they are at best implicitly aware of, but which may be evidenced in their practices, their desires, or their aims” (p. 52). Another chapter [4.5] proposes a set of “unifying themes that reflect goals for mathematics teacher education” (p. 95): developing adaptability; fostering awareness to similarities and differences; coping with conflicts, dilemmas and problem situations; learning from the study of practice; selecting and using (appropriate) tools and resources for teaching; identifying and overcoming barriers to students’ learning; sharing and revealing self, peer, and student dispositions.

Many of the chapters draw from critical reflection on personal experience to analyse core aspects of the professional work of teacher educators. Two chapters from different countries [4.12 & 4.14] focus on the work of designing and teaching preservice courses on mathematics teaching ‘methods’ for elementary/primary education (providing interesting scope for comparison). Another chapter [4.3] examines the development of a course to prepare mathematics educators with a wide range of backgrounds to lead professional development of serving teachers. Two chapters [4.4 & 4.13] illustrate how some teacher educators have appropriated and expanded a range of intellectual tools from sociocultural theories to guide aspects of their planning and teaching of courses (again providing interesting scope for comparison). A more synoptic chapter [4.11] offers “detailed accounts of documented practices that focus on links between theoretical course work and teaching practice” arguing that “such linking practices have the potential to bridge the didactic divide between disciplinary and pedagogical knowledge” (p. 223). Finally, two chapters address relational dimensions of teacher education in the form of discussions of caring relations [4.15] and trust and respect [4.16].

In summary, then, this volume offers a variety of reflections and reports, generally grounded in the personal experiences and approaches of the authors. While few of the chapters identify mathematically related issues that have not already been treated in earlier volumes of the Handbook, they illustrate how such issues play out in the professional work of mathematics teacher educators. Nevertheless, there is clearly a need for research which examines a range of perspectives and practices. Such research could be dialogic in style, based on cross-reflection between mathematics teacher educators with differing stances and strategies; or it could be analytic in style, conducted by a research team aiming to identify, characterise and contextualise the variety to be found amongst mathematics teacher educators. At the same time, some of the issues raised in this volume arise much more widely across teacher education. Might it be beneficial for mathematics teacher educators to share their reflections with colleagues in other areas? Indeed, might some issues might be better researched by focusing more broadly on “the teacher educator as a developing professional”, regardless of specialism?

Conclusion

These volumes are useful in collecting together current thinking and recent research about mathematics teacher education. IHMTE, in particular, represents a substantial resource for those interested in this field. The perspectives and priorities of university-based teacher educators predominate: the voices of other professional developers, and of professional leaders and policy makers are hardly heard. This reflects not just the pivotal position that university-based teacher educators occupy within the professional field, and their crucial contribution to developing research in this area, but the persisting influence of relatively introspective approaches to reflective practice. Equally, while many of the issues examined are shown to have a distinctive mathematical dimension, others appear more generic in character and are better suited to investigation in such terms. Indeed, whatever the issue, parallels in cognate areas offer scope for productive comparison. In short, strong identification by researchers within the field has contributed to establishing and institutionalising research in

mathematics teacher education. However, there is scope for wider interaction with other disciplinary areas and closer attention to other stakeholder agendas, both to renew critical reflection in the field and to increase its professional influence.

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