Mathematics Teacher Educators' Knowledge for Teaching

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Report

The aims of DG12 were to:

- Facilitate discussion of key issues related to the knowledge required by mathematics teacher educators (MTEs).
- Identify different emergent strands in research that can be related to this area.
- Summarise research and research/theoretical perspectives related to knowledge for mathematics teacher education.
- Identify research directions and potential collaborations that will move the field forward.

Four broad areas were suggested to frame discussions. In summary these were:

- To what extent are the various knowledge types for mathematics teachers described by Shulman (1987), Ball et al. (2008) and others applicable/transferable to MTEs? How does the knowledge needed by MTEs differ from that required by mathematics teachers? Is it a kind of meta-knowledge or something as distinct from the knowledge for teaching mathematics as knowledge for teaching science is?

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- Who researches MTEs' knowledge? What are the dilemmas and opportunities associated with researching ourselves? What evidence is there of the knowledge required by MTEs? What measures/criteria are there for successful mathematics teacher education and how are they connected to MTEs' knowledge? What methodologies might be effective in building such an evidence base?
- How is knowledge for mathematics teacher education acquired? How is the transition from mathematics teacher to mathematics teacher educator made and what is gained or lost in the transition? To what extent and in what ways is knowledge for teaching mathematics necessary for MTEs? What theories of learning are useful? What models are/should be used?
- Why might it be important to articulate knowledge for MTEs? What contribution can understanding it make to our work and to mathematics education more broadly? Who wants to know about this knowledge and why?

The first session was attended by more than 45 participants from at least 18 different countries. There was a broad range of experience and expertise in relation to the topic with many participants acknowledging that they had not given MTEs' knowledge serious consideration prior to attending the discussion group. Discussion in session 1 focussed on areas 1, 3 and 4 and ended with participants writing down one or more questions that they had about MTEs' knowledge. These were grouped into five themes, summarised below, that formed the basis of discussion in the second session.

Theme 1: The Nature of the Knowledge Needed by MTEs

What knowledge of mathematics is needed by MTEs? What differences are there between teaching at university level and school? What is the distinction between Mathematics Knowledge for Teaching (MKT) and mathematics knowledge for MTEs? Is MKT the 'curriculum' that MTEs teach? How do MTEs' conceptions of teaching and learning develop? How can we research these? How do these conceptions translate into their teaching? Is there a connection to student learning? What aspects of MTEs' knowledge are important? What knowledge do MTEs for in-service teachers need? How is it different from knowledge needed for pre-service teacher education? How can MTEs for in-service MTEs be educated?

Theme 2: Different Types of Mathematics Teacher Educators and Implications for the Knowledge Needed

Who are the MTEs? How does local context impact on MTEs? What kinds of courses would cater for the differences between MTEs (e.g., mathematicians, former mathematics teachers, mathematics education researchers)? Is the same

knowledge needed by all MTEs? Is it possible for one person to have/develop all the knowledge necessary? Is it helpful to consider mathematics education as team work?

Theme 3: Research Methodologies/Approaches

In what ways might teacher collaborative inquiry among MTEs provide a methodological framework for research in this area?

Theme 4: Acquisition of Knowledge for Mathematics Teacher Education

How can programs be developed specifically for MTEs of mathematics teachers at different schooling levels? How can professional development for existing MTEs be provided? What is the importance of role models in the development of MTEs? What knowledge is acquired through apprenticeship models? What are the relationships between MTEs' background and the way they acquire knowledge? How can MTEs develop the capacity for inquiry into their own practice? What is the role of collaboration and mentoring?

Theme 5: The Importance of Research in This Area

How can we ensure that the appropriate resources are allocated towards this work?

Future Directions

Many participants indicated their interest in progressing the work through a book or journal publication. There was also interest in international comparative research on MTE backgrounds and the relationship of this to MTE practice and outcomes.

References

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Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review, 57*(1), 1-22.