

## **Progressing Mathematics Education Through International Handbooks + A Personal Reflection by M.A. (Ken) Clements**

The First International Handbook of Mathematics Education (HB1) was published by Kluwer Academic Publishers in 1996. Although, I was one of the five editors of HB1—the other editors were Alan Bishop, Christine Keitel, Jeremy Kilpatrick and Colette Laborde—and was involved in the selection of authors for that massive 1358-page, 36-chapter, 2-volume compilation, none of the 72 scholars we chose to write chapters for HB1 was based in an Asian nation. By contrast, 14 of the 60 authors who contributed to chapters in the Fourth International Handbook of Mathematics Education (HB4), to be published by Springer in 2024, are based in Asia. I have been the coordinating editor for HB4. Following an overview of how HB4 was prepared I reflect on my own background in education, especially mathematics education.

### **Preparation of *HB4***

The preparation of Springer’s Fourth International Handbook of Mathematics Education (hereafter HB4) differed from that for the first three international handbooks, HB1, HB2, and HB3. I was one of the editors of HB1 (published in 1996), and of HB2 (published in 2003). I then became the coordinating editor for HB3 (published in 2013) and for HB4. For the first three handbooks the preliminary meetings had been of the in-person, face-to-face variety, and were held in Australia, Brunei Darussalam, France, and the United States of America—each meeting lasting several days. In 2021, I was the only remaining editor available from the earlier handbooks, and I invited and secured the appointments of four new section editors for HB4—Berinderjeet Kaur (of Singapore), Tom Lowrie, (of Canberra, Australia), Vilma Mesa (of Michigan, USA), and Johan Prytz (of Uppsala, Sweden). The team of five editors for HB4 decided that key editorial decisions regarding HB4 should be made via ZOOM meetings.

In early discussions among the five HB4 editors, three fundamental agreements were reached:

1. HB4 would have four sections and would focus on four areas of contemporary interest in the field—“Mathematics Education in Asia” (Section A, editor Berinderjeet Kaur), “The Roles of Theory in Research and Practice” (Section B, editor Tom Lowrie), “Equity and Social Justice” (Section C, editor Vilma Mesa) and “Curriculum and Change” (Section D, editor Johan Prytz);
2. In HB4 we should not shy away from presenting controversial issues relating to mathematics education research as it was, and is, conducted on the international stage; and
3. In each of the four sections of HB4 due attention would be given to (a) historical factors, (b) contemporary related literatures, and (c) likely future policy directions.

After much discussion among the HB4 editors, decisions were reached unanimously which undoubtedly affected the directions taken by the chapter authors (who were selected after discussion between the editors) in each section. For example, the authors of one of the chapters in Section B, on the roles of theory and practice, took a strong historical approach—arguing that the most powerful theoretical influences on school mathematics curricula over the centuries, and even today, were the Hindu-Arabic numeration system and Euclidean geometry.

Such an argument was uncommon, rarely to be found in the literature on the selection and roles of theory.

Consistent with the desire not to shy away from controversial issues, and to give due accord to issues associated with equity and social justice, the HB4 editorial team fearlessly called for attention to be given to matters which were likely to generate disagreement, even among editors, authors and HB4 readers. For example, on gender-related issues attention would be given to LBGQT in relation to mathematics education. The plight of Palestinian students would also be considered.

The first International Handbook of Mathematics Education (HB1) was published in 1996, at a time when mathematicians, mathematics educators, education administrators, and politicians across the world were still asking why Japanese children outperformed children in schools in the United States of America and in Western European nations on standard school mathematics tasks (Stigler & Baranes, 1988). Indeed, at that time UNESCO published a book authored by Nerida Ellerton and myself (entitled *Mathematics Education Research: Past, Present and Future*) which showed, on its cover, a map of Southeast Asia—we wanted to draw attention to the likelihood that mathematics education researchers would pay much more attention to the issue of why many Asian school children seemed to be doing so well in mathematics.

#### **Four International Handbooks of Mathematics Education**

Although I was one of the five editors of HB1—the other editors were Alan Bishop, Christine Keitel, Jeremy Kilpatrick and Colette Laborde—and was involved in the selection of authors for that 1358-page, 36-chapter, 2-volume compilation, none of the 72 scholars we chose to write chapters for HB1 was based in an Asian nation. For the 984-page, 2-volume, HB2, which was published in 2003, Frederick Leung, of the University of Hong Kong, replaced Colette Laborde, as one of the editors, and 5 of the 53 contributing authors were based in Asia. For the single volume, 1120-page HB3, published in 2013, 10 of the 83 authors were based in Asia. For HB4, to be published in 2024, there are 60 authors, and of those 14 are based in Asia (despite the fact that all chapters in HB4 have been written and will appear in the English language). Obviously, between 1996 and 2024, there was a marked shift in the balance of nationalities among the sets of authors who were selected. For HB4 only 14 of the authors are based in the United States of America, and 14 in Europe. HB4 has 28 chapters and is divided into four “sections.”

#### **Mathematics Education in Asia**

The first section, edited by Berinderjeet Kaur, focuses on mathematics education research in Asia. In this section the authors make it clear that it is unwise to think of mathematics education as being the same across continents—for example, across the nations which make up Asia (or, for that matter, across any other continent). In Section A, authors provide scholarly summaries of intended, implemented, and attained mathematics curricula in various Asian nations, including China, India, Indonesia, Japan, Korea, Thailand, Taiwan and Singapore.

#### **Roles of Theory in Mathematics Education**

Tom Lowrie of the University of Canberra, is the editor for Section B of HB4, which is concerned with “The Roles of Theory in Research and Practice.” Section B asks researchers to

reflect on how much they should be expected to identify theoretical bases for their research. But, surely it is not sufficient merely to outline what is supposed to be the theoretical “research bases” for proposed research studies (as occurs, for example, in many “proposal defences” by prospective graduate students). There are also issues associated with how teachers and researchers should make use of research literatures they choose to link with their teaching and research. In fact, some of the Section B authors for HB4 ask whether teachers and researchers are usually consciously aware of the theoretical bases for what they actually do.

### **Equity and Social Justice Issues + A Personal Reflection**

In her introduction to Section C of HB4, Vilma Mesa claims that “relative to the equivalent section in HB3 the work in this section shows significant theoretical development, building upon well-known works that use a critical approach in mathematics education as well as more general theories.” Having carefully read every chapter in each of the four international handbooks of mathematics education, I must say I agree with Vilma’s assessment of theoretical progress over the period 1996–2024. However, while reading her words, I thought more deeply about equity considerations and social justice issues in mathematics education, and in particular, those which have affected me.

My mother was one of 16 children, and I had something like 80 first cousins, almost all of whom lived and grew up in rural Australia. Because of serious health problems experienced by my father, when I was five years old my family moved from a farm in rural Victoria to Melbourne. This gave me the opportunity (which none of my cousins had) to go to school “in the city.” At that time, my parents, two brothers, my sister and I lived in one room in a small house in Footscray, a decidedly working-class suburb of Melbourne, Australia. I attended a local primary school and found that I was “good” with numbers—something I believe I inherited from my mother (who had left school after fifth grade). I do not think that any of my cousins went to school beyond tenth grade. In Footscray, my father worked as a low-paid machinist in a farm-machinery factory and my mother attended to household duties. Times were tough, but I knew nothing different.

Anyway, I did well at school, and eventually moved on to the University of Melbourne, where I majored in Pure Mathematics and Applied Mathematics (with separate sets of subjects). At the University I attended lectures and tutorials, learned to answer mathematics questions, and did well on examinations. Although I certainly did develop an appreciation of the beauty and power of pure mathematics, and of its awesome predictive applications in applied mathematical contexts, while studying higher mathematics I don’t think I really knew where these studies would take me. After acquiring teacher-education qualifications, I taught mathematics for 10 years in several schools in Victoria (Australia) before gaining a mathematics education appointment, “training” mathematics graduates at Monash University (a “new” university in Melbourne) who wanted to be teachers.

At the time, I didn’t think about where I had come from and how I got to where I was. It all just happened! Cricket, football, chess (I was Victorian under-18 chess champion), church and family were more important to me than mathematics. I enjoyed mathematics and loved teaching, and recognised that this was my passport to a job, and to “respectability.” It seemed to me that “some kids were good at mathematics, but most were not” and I was one of the lucky ones. But, I wonder, are students today who are good at mathematics and live in Indonesia, or

Tonga, or in remote parts of the Northern Territory of Australia, or who study higher mathematics in the Department of Mathematics at Harvard University, “lucky”? Or, should “lucky” be interpreted in terms other than socioeconomic circumstances and more towards “values”—a point of view argued by authors of several HB4 chapters?

### **Curriculum and Change**

Issues associated with “Curriculum and Change” have been much discussed in all four international handbooks of mathematics education, and Johan Prytz and his team of Section D authors for HB4 have done an excellent job in identifying important theoretical and practical intended, implemented, and attained curriculum developments over the past 10 years or so. The changes have been so profound—for example, consider how digitalization is challenging and affecting the practices of mathematics teachers and mathematics education researchers—it has become almost impossible for most practitioners to keep up with developments. In his introduction to Section D of HB4 Johan discusses the impact of what he calls “massification” by which rapidly increasing proportions of students across the world are being expected to learn more and higher non-trivial levels of mathematics—a trend which has accelerated over the past 10 years. I ask myself the question—are there any “lucky” ones within this development, and if so, who are they, and why are they lucky? And what is the fate of the “unlucky” ones? Whose task is it to reduce the proportion of unlucky ones, and how can that be best achieved?

### **A Final Word**

Two final questions arise: First, what should be the respective roles of the International Association for the Evaluation of Educational Achievement (IEA) and TIMSS, and UNESCO and PISA, in helping to increase the proportion of lucky ones? And second, do the answers to that first question vary within and across nations, and regions within nations, and do they depend on whether “luck” is interpreted in terms of family circumstances, or values?

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M.A. (Ken) Clements, Professor Emeritus, Department of Mathematics, Illinois State University, USA. Email: [makenclements@gmail.com](mailto:makenclements@gmail.com)