

Foreword

When Rongjin Huang shared with me several months ago that his work has been accepted for publication as a monograph, I could not be happier. Rongjin conducted this study to compare knowledge of algebra for teaching (KAT) among Chinese and U.S. prospective mathematics teachers as it relates to the courses they have taken. What this book is going to share with us seems straightforward, and readers may think it is just another story about the knowledge gap between Chinese and U.S. prospective mathematics teachers. However, there are several aspects that help make this book a unique contribution, and I would like to share them with you.

First of all, this work builds upon Rongjin's years of experiences in China as a mathematics teacher, teacher educator, and researcher. Before coming to the United States in Spring 2008, Rongjin worked in China as a high school mathematics teacher and then as a teacher educator in Shanghai and Macao for several years. During his time in China, Rongjin worked very productively as a teacher and a researcher. An important feature of Rongjin's research is that he tends to develop research topics with a close connection with mathematics education practices especially at middle and high school levels. Rongjin's years of teaching experiences in high schools and universities helped him develop a long-standing interest in examining and understanding mathematics teaching, teachers' knowledge, and teacher education practices in China. Thus, readers can be assured that Rongjin brings an insider's perspective to this study about prospective mathematics teachers' knowledge and their course taking in China.

Second, Rongjin has been in the United States since the Spring of 2008, first as a doctoral student at Texas A&M University and then a mathematics teacher educator and researcher. For the past six years, Rongjin has had many opportunities to work directly with prospective teachers in various capacities. Those experiences provided him the first-

hand knowledge and experience with prospective mathematics teachers and their education in the United States, which are important for designing and carrying out this cross-national comparative study.

Third, this work builds upon Rongjin's on-going research on mathematics instruction, teacher knowledge, and teacher education. His expertise is well illustrated through many of his works in these topic areas (e.g., Bednarz, Fiorentini, and Huang, 2011; Huang and Bao, 2006; Huang, Li, Zhang, and Li, 2011; Li and Huang, 2013). He has been persistent in examining and understanding the nature of mathematics instructional practices and teacher professional development, especially in China and the United States. For example, he found that Chinese teachers are more likely to implement mathematical tasks with high cognitive demands than their U.S. counterparts. Moreover, Chinese teachers continuously develop their expertise in unique ways such as jointly developing public lessons. Readers can thus expect to gain further insights from this book about cross-national similarities and differences in mathematics knowledge for teaching among Chinese and U.S. prospective mathematics teachers.

It needs to be clarified that Rongjin's background and on-going research are not enough to justify, but help position him to make the unique contribution to this book. Here I want to highlight another three aspects that help distinguish this book from what can be easily perceived as another 'trivial' comparative study.

1. This book presents cross-national similarities and differences in KAT among Chinese and U.S. prospective mathematics teachers, which also helps contribute to our understanding of the nature of KAT from an international perspective.

This book focuses on a study that examines similarities and differences in knowledge of algebra for teaching (KAT) between Chinese and U.S. prospective mathematics teachers. Readers can certainly learn about the reported knowledge gap between these two groups of prospective mathematics teachers; a result that has been speculated but not studied before.

In my view, the unique value of this work goes beyond reporting the knowledge gap to make potential theoretical contributions to our understanding of the nature of KAT from an international perspective. It is commonly acknowledged that teachers' knowledge is key to effective classroom instruction, but less agreed on specific knowledge components and their structure. Rongjin presented and discussed several different perspectives about mathematics teachers' knowledge in general, algebra knowledge for teaching in specific. These perspectives are valuable in certain ways, but are typically derived from works within a specific education system and cultural context. Understanding the nature of mathematics teachers' knowledge can be strengthened from an international perspective (Li, 2014). Rongjin made a unique contribution through this study by examining and discussing different knowledge components (i.e., school mathematics, advanced mathematics, and teaching mathematics) and the structure of KAT based on the data obtained from Chinese and U.S. prospective mathematics teachers. The relationships of these knowledge components are clearly not universal but vary by several factors embedded in different program and cultural contexts.

2. This book reports cross-national similarities and differences in KAT with the use of a modified survey, which also helps contribute to our understanding of its feasibility and limitations.

The results reported in this book were obtained by surveying selected prospective mathematics teachers in China and the United States. Questions can easily be raised about the study's sampling method (376 prospective mathematics teachers from five universities in China but 115 from only one university in the United States) and the development and use of a modified survey instrument. It is clear that Rongjin kept these limitations in mind, and used alternative approaches that help contribute to our understanding of its feasibility and limitations. In particular, to address the sampling limitation, he classified the five participating universities in China into three categories in terms of their institutions' ranking. This classification helps provide differentiations and clarity about prospective mathematics teachers' KAT in his data analyses and reporting.

Moreover, the survey instrument was adapted from one that was originally developed and used in a U.S. project. The use of such a U.S.-originated survey instrument in an international comparative study requires further validation and possible modifications. As explained in this book, Rongjin took necessary steps to modify the survey instrument based on a study of mathematics curriculum standards in China, experts' validation of the survey's content, and Chinese in-service teachers' validation of the survey instrument. Moreover, he also added some open-ended items that helped elicit prospective teachers' thinking behind their answers, as well as follow-up interviews with selected prospective U.S. teachers who provided very limited explanations. All of these steps illustrate some unique features in the research methodology that Rongjin employed and contributed in this seemingly straightforward international study.

3. This book relates to cross-national similarities and differences in mathematics training provided to prospective mathematics teachers, which also helps contribute to our understanding of cultural values and what is important for prospective mathematics teachers to learn.

The results present a picture that is consistent with previous studies about the knowledge gap between Chinese and U.S. in-service teachers (e.g., Ma, 1999).

Readers should not be surprised to find out that prospective mathematics teachers' KAT relates to what they are expected to learn in and through teacher preparation programs (i.e., opportunity-to-learn, or OTL). As presented in this book, the number of courses in mathematics content and mathematics education has dramatic differences across teacher preparation programs in China and the U.S. While teacher preparation programs in China tend to require many more mathematics content courses than those programs in the U.S., the pedagogical training required for prospective teachers presents a reversed picture. Rongjin pointed out that similar differences were also reported in previous studies. Such consistent differences further suggest a cultural root in different valuations of what are important for prospective mathematics teachers to learn between China and the United States (Lappan and Li, 2002).

Like many other studies, this book not only provides readers with many important and unique results, but it also leaves readers with many more questions unanswered. With some questions highlighted at the end of this book, I am sure that reading this book will inspire readers to come up with more questions either directly related to this study or to teachers' knowledge and their education in one's own education system. With this belief, I recommend this book as an important reading to all of those who are serious about examining teachers' mathematics knowledge for teaching and exploring ways of improving teachers' professional development.

Yeping Li
Texas A&M University
College Station, USA
yepingli@tamu.edu

References:

- Bednarz, N., Fiorentini, D., & Huang, R. (Eds.). (2011). *International approaches to professional development for mathematics teachers*. Canada: Ottawa University Press.
- Huang, R., & Bao, J. (2006). Towards a model for teacher's professional development in China: Introducing keli. *Journal of Mathematics Teacher Education*, 9, 279-298.
- Huang, R., Li, Y., Zhang, J., & Li, X. (2011). Developing teachers' expertise in teaching through exemplary lesson development and collaboration. *ZDM- The International Journal on Mathematics Education*, 43(6-7), 805-817.
- Lappan, G., & Li, Y. (2002). Reflections and recommendations. *International Journal of Educational Research*, 37, 227-232.
- Li, Y. (2014). Learning about and improving teacher preparation for teaching mathematics from an international perspective. In S. Blömeke, F.-J. Hsieh, G. Kaiser & W. H. Schmidt (Eds.). *International perspectives on teacher knowledge, beliefs and opportunities to learn*. (pp. 49-57). Dordrecht: Springer.
- Li, Y., & Huang, R. (Eds.). (2013). *How Chinese teach mathematics and improve teaching*. New York: Routledge.

Prospective Mathematics Teachers' Knowledge of
Algebra

A Comparative Study in China and the United States of
America

Huang, R.

2014, XXI, 179 p. 23 illus., Softcover

ISBN: 978-3-658-03671-3