TEXTBOOK SIGNATURES: EXPLORATION AND ANALYSIS OF MATHEMATICS TEXTBOOKS WORLDWIDE

Angel Mizzi¹, Ban Heng Choy² and Mi Yeon Lee³
¹University of Duisburg-Essen; ²National Institute of Education, Singapore; ³Arizona State University

AIM AND RATIONALE

Textbook analyses can provide a comparison of learning opportunities triggered by textbooks among different countries. Being an important medium for representing the written curriculum, textbooks play an important role in shaping mathematics learning and teaching in schools. Hence, international textbook analyses can potentially offer insights into curriculum intents and the suggested teaching approaches in the different countries. Building on the idea of lesson signature suggested by Hiebert et al. (2003), Charalambous et al. (2010) propose that textbooks within the same country may have a "textbook signature"—"uniform distinctive patterns"—in the textbooks (p. 146). Using these ideas, we have proposed a notion of textbook signature and have attempted to characterise our analyses of textbooks in gradient (Choy, Lee, & Mizzi, 2015) and fractions (Lee, Choy, & Mizzi, 2016) using our notion of textbook signatures. Our comparative studies on introduction of notions of gradient and fractions in Germany, South Korea and Singapore imply that textbook signatures are unique in different countries and may hold important implications for teaching and learning.

Following a discussion group (DG) about textbook signatures, which took place in PME 40 in Hungary, we have concluded that research into our notion of textbook signatures is a promising strand of research. For example, textbook signatures can potentially describe and explain the different curricular approaches adopted in different educational contexts for improving the way of teaching and learning mathematics. However, our DG participants highlighted the need for more data analyses using textbook signatures from a larger number of countries or within the same country (especially from countries with a non-centralized educational system). Hence, one of the main goals of this working session (WS) is to provide interested researchers to collaborate and work on textbook analyses using our notion of textbook signatures. Participants of this WS are invited to carry out a textbook analysis focusing on the introduction of gradient for their own country:

Hence, participants are required to bring along one textbook or a copy of the first chapter(s) of the textbook which introduces the topic of gradient to students the first time at secondary level in their respective country.

We not only aim to present the findings of our textbook analyses using textbook signatures, but also refine our notion of textbook signature during the WS. We believe that this WS will be a good platform for researchers to have conversations about textbook signatures and their relevance in mathematics education.

KEY QUESTIONS
The working session activities will be guided by the following key questions:

- What is our current notion of textbook signatures and how can it be applied to different textbooks worldwide?
- What curricular and textbook features can be seen in the textbook signatures from different countries?
- What implications for teaching and learning mathematics can be drawn from textbook signatures?
- How can we refine our notion of textbook signatures following our findings from the WS?

WORKING SESSION ACTIVITIES

<table>
<thead>
<tr>
<th>Segment</th>
<th>Duration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15 min</td>
<td>Session 1: Presentation: Notion of textbook signatures by Angel Mizzi</td>
</tr>
<tr>
<td>2</td>
<td>10 min</td>
<td>Session 2: Recap of what we discussed in PME 40 by Ban Heng</td>
</tr>
<tr>
<td>3</td>
<td>15 min</td>
<td>Session 1: Illustrative use of theoretical framework and presentation of textbook analysis techniques by Ban Heng and Mi Yeon</td>
</tr>
<tr>
<td>4</td>
<td>50 min</td>
<td>Session 2: Working Session - Exemplary textbook analyses</td>
</tr>
<tr>
<td>1</td>
<td>50 min</td>
<td>Session 1: Working Session - Initial textbook analyses</td>
</tr>
<tr>
<td>2</td>
<td>10 min</td>
<td>Session 1: Presenting first ideas, results or barriers upon application of the textbook signatures framework</td>
</tr>
<tr>
<td></td>
<td>15 min</td>
<td>Session 2: Rounding Up: Closing remarks and future research</td>
</tr>
</tbody>
</table>

References

WHAT DOES “SOCIO-CULTURAL” MEAN IN TEACHING AND LEARNING

Yasmine Abtahi1, Mellony Grifth2, Melissa Leatham3, Elizabeth S. Henley4
1University of Ottawa, 2Rhode Island University, 3The Ohio State University, 4London South Bank University

To make sense of issues related to mathematics education, it is important to develop an understanding of the social, historical, and cultural perspectives that influence the way it is taught and learned. This understanding involves examining the ways in which social, historical, and cultural contexts and systems influence learning.

Assuming that we are born into already developed social systems, Wertsch (1994) believes that learning is social (including learning) without taking place in a social setting. But in consideration of such social systems as mathematics educators examine mathematics. At one level, the question is how our understanding differs from another. Over many decades, both these questions—"social origin of learning," or "mediation"—and the way these two approaches are linked to mathematics—terms such as mediation, voices, and the zone of proximal development—expands and deepens our understanding of the socio-cultural perspective.

The following question will guide our exploration: "social origin of learning," or "mediation," as well as at different research settings. In this working group, we are interested in examining examples of children's contributions to participants, to look into how we use as we speak about social mathematics—terms such as dialectical mediation. The following question will guide our exploration: how these terms in our understanding of the socio-cultural perspective can include mediation, voices, and the zone of proximal development.