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Reform on a shaky ground? A comparison of algebra tasks from TIMSS and Swedish textbooks

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Background

In the Swedish curriculum reform of 2011, TIMSS and PISA were explicitly mentioned as a point of departure (Skolverket, 2011). More precisely, algebra was singled out as a topic where students needed to improve their knowledge. Given the large influence of international large-scale assessments, ILSAs, the items of these tests should be further investigated (Säljö & Radišić, 2018).

Comparative studies using data from ILSAs have concentrated on their results, not their tasks (Jablonka, Andrews, Clarke, & Xenofontos, 2018). Moreover, while textbook tasks are common in comparative studies, these often focus on how the learning of a specific topic is presented in textbooks from different countries (Jablonka et al., 2018). They are not considered in relation to curriculum reforms.

The aim of this study is to problematize the role of ILSAs in national curriculum reforms. It builds on results from a previous study of textbook tasks by Palm Kaplan and Prytz (submitted) and is a part of a thesis project which problematizes the role of ILSAs and textbooks in curricular reform, by looking at the algebra in TIMSS 2003–2015 and algebra chapters in Swedish textbooks. This study focuses the case of Swedish school algebra and the 2011 curriculum reform through looking at algebra items from TIMSS 2003, compared to changes in year 8 algebra tasks in three Swedish textbook series. The research question is

- To what extent is the algebra in TIMSS consistent or in conflict with algebra chapters in Swedish textbooks?

Theory and method

The algebra items in TIMSS 2003 are studied to understand what the student is expected to engage with, when solving the items. To get a detailed picture of the items, discourse analysis is combined with an analysis of the algebra offered. These two aspects are discussed in terms of school algebra discourses and algebraic activities respectively. The school algebra discourses are constructions in linguistic resources (Luke, 1995), steering what choices are possible to express different ideas while the algebraic activities mainly builds on Blanton et al.’s (Blanton et al., 2015) ‘big ideas’ in algebra. One of these is functional thinking, which is the activity to investigate, represent and generalize relationships between co-varying entities (Blanton et al., 2015), e. g. number patterns. The analytic frameworks are further developed on the poster and in Palm Kaplan and Prytz (submitted).

The analysis is conducted in several steps. The two aspects mentioned above are analyzed in the items to obtain the distribution of the algebraic activities in the school algebra discourses. The distribution is then compared to the results of the Palm Kaplan and Prytz (submitted) textbook
analysis of 1557 algebra tasks from algebra chapters in six Swedish textbooks. These books come from three textbook series which were on the market before and after the 2011 curriculum reform. TIMSS 2003 entail 45 valid algebra items out of 47. Two trend items are left out since in TIMSS 2007, they are coded by TIMSS as data and chance instead of algebra. Items including more than one activity or more than one discourse are also left aside in this study, for reasons concerning statistical analysis in the thesis. All items are used with permission from the Swedish National Agency of Education. They are chosen as a starting point for further analysis, which will also include the algebra items from TIMSS 2007, 2011 and 2015 in order to understand the development of TIMSS’ algebra.

Results

The distributions of the algebraic activities in the school algebra discourses are reasonably corresponding when TIMSS-items are compared to Swedish algebra chapters. However, there are differences between the proportions in the distributions: Swedish algebra chapters concentrate on mainly two algebraic activities while TIMSS 2003 entail other algebraic activities to a larger extent. For example, functional thinking is more stressed in TIMSS. The proportions of the school algebra discourses also differ in the TIMSS-items from the Swedish algebra chapters, and a whole new discourse, the Relational discourse, was identified in the TIMSS-items. This discourse constructs algebra as relationships between variables in graphs, tables and symbols; whereas the other discourses, identified in the algebra chapters, do not use graphs as a resource and only occasionally use tables. In Swedish textbooks though, chapters on functions and relations are often saved for year 9, which is the year after the TIMSS-test is taken. Though it is difficult to assess since there are few algebra items in one TIMSS-test compared to in textbooks, these results make one of the points of departure for the Swedish curriculum reform in 2011 questionable.

References


