Multi-semiotic progression in school mathematics

Abstract

In mathematical school language, both everyday and technical expressions are commonly used (Barwell, 2013). This means that two discourses, an everyday and a technical discourse, are used together and that students must handle these two discourses simultaneously. In this study, we investigate how images and natural language are used to express these two discourses in Swedish national tests for grade three, six and nine. The aim is to learn more about progression in multi-semiotic demands in mathematical subject language.

The theoretical base for this study is social semiotics (e.g. Kress & van Leeuwen, 2006), which also forms the framework for the analysis. In a first step of the analysis, the coding orientation (ibid.) in the images was examined, i.e. whether the images express the mathematical content in a naturalistic coding orientation, with a connection to everyday situations, or in a technical coding orientation implicating a subject specific and technical focus in the mathematical content. In the next step, cohesion regarding coding orientation between image and text will be studied, i.e. how participants, processes and circumstances are expressed by an everyday or technically oriented in written natural language and in images and how cohesion is expressed between these two semiotic resources.

The analysed materials are the latest released Swedish national tests in mathematics for grade three, six and nine. This means that for grade three and six, the test from 2015 have been studied, while the test for grade nine was from 2013.

Preliminary results from the first step of the analysis, show that for a clear majority of the images in the test for year three and six, the coding orientation is naturalistic. The images are to a very high degree drawings of people, naturalistic objects or environments. In year nine, the opposite applies and a technical coding orientation is the most common. Exceptions can be found in the problem solving tasks, with a relatively comprehensive contextual description. In these problem solving tasks, images with a naturalistic coding orientation are used even in grade nine.

A tentative conclusion is that there is a rather significant progression towards a more technical language in the multi-semiotic language used in this sample of the Swedish national tests. The results indicate a need to highlight the function of the various multi-semiotic resources used in school mathematics, in order to support the students’ development of the subject language. These results are relevant for a Swedish, as well as for a Nordic school context and literacy research, since there are great similarities between the school systems in the Nordic countries.

References
