

Picturing Mathematical Discourse with Socio-mathematical Norms in Functional Inquiry Learning

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Keywords: socio-mathematical norms, “picturing mathematical discourse”, inquiry learning

This research analyzes the process of inquiry learning of mathematical problem solving based on discourse with pictures and the teacher’s interventions into this process. Yackel and Cobb’s “socio-mathematical norms” (1996) provided a framework for mathematical learning of interaction in sociological norms. They described the process of inquiry learning for arithmetical problem solving based on discourse in typical American elementary schools.

My research is important because until now it has been argued that mathematical discourse had problem solving with socio-mathematical norms. I investigated the process of functional inquiry learning based on “picturing mathematical discourse” mathematical problem solving through pictures that are created in the learning community with socio-mathematical norms. Data were collected from twenty functional class discussions and pictures in two third-grade classes in junior high school in Japan. These sources were examined using “constant comparative method” as developed by Strass and Graser (1967). This method interprets observation compared step by step in a classroom between video recorder and fieldnotes to textdata.

The following results emerged from the analysis: 1) Functional inquiry learning is needed to form socio-mathematical norms for problem solving by learning communities; 2) socio-mathematical norms were needed in teacher’s interventions to facilitate students’ explanations; 3) if the students had mathematical problem solving explained with pictures, these pictures were accepted as valid by the learning community. Finally it was found that conceptually there was functional semantic congruence between the numerical formula of algebra and the figures of geometry.