Argumentation and school mathematics

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Aims:

(1) To investigate views of mathematics educators regarding deductive reasoning and argumentation in school mathematics.

(2) To compare and contrast characteristics of argumentation in algebra classes taught by the same teacher using the same curriculum materials.

Methodology

Research aim 1. Data sources include individual semi-structured interviews with 21 people involved in mathematics education and logic (e.g., math teachers, math curriculum developers, researchers in math education). Data analysis is based on the Grounded Theory method.

Research aim 2. Two case studies; each comprised of two 7^{th} grade classes studying algebra with the same teacher using the same curriculum materials. Verbal analysis of video-tapes (15-19 lessons in each class) will be used to analyze different aspects of argumentation (e.g., structure of argumentation, conceptual basis of argumentation).

Initial findings (regarding Research aim 1 only)

Three distinct views regarding the role mathematics learning could play in the development of deductive reasoning were identified. Each interviewee's view was interrelated with the interviewee's approach to deductive reasoning and its nature inside and outside mathematics. One group approached deductive reasoning as an action of inference based on formal logic rules, which is usable outside of mathematics alongside "softer" rules of inference. They claimed that there is a need for a deliberate intervention in order for mathematics to develop argumentative habits and skills. Another group approached deductive reasoning as an action of inference based on formal logic rules, which is usable in mathematics only. They clearly doubted the possibility of developing deductive reasoning that is not restricted to mathematics. Another group regarded learning mathematics as spontaneously improving students' deductive reasoning. Yet, these interviewees addressed only systematic aspects of reasoning, with no attention given to logic.