ELEMENTARY TEACHERS' BELIEFS ABOUT TEACHING MATHEMATICS AND SCIENCE: IMPLICATIONS FOR ARGUMENTATION

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Teachers in the elementary grades often teach all subjects and are expected to have appropriate content knowledge of a wide range of disciplines. Current recommendations suggest teachers should integrate multiple disciplines into the same lesson, for instance, when teaching integrated STEM lessons. Although there are many similarities between STEM fields, there are also epistemological differences to be understood by students and teachers (see, e.g., Conner & Kittleson, 2009). How to teach STEM lessons without ignoring the unique characteristics, depth, and rigor of each discipline is an open question (Kertil & Gurel, 2016). This study investigated teachers' beliefs about teaching mathematics and science using argumentation and the epistemological and contextual factors that may have influenced these beliefs.

This qualitative study was conducted in a professional development course designed for elementary teachers. Participants in this study included 14 teachers from a rural school district in the southeastern United States. Data sources include video recordings and transcripts from one in-class meeting of the course and two semi-structured interviews with each participant.

The majority of elementary teachers in this study believed argumentation was an important part of teaching all subjects. Their beliefs about argumentation in science suggest that they see argumentation as inherent in the learning of science: "Scientific inquiry is very similar to argumentation" (Gloria, Int. 2). Teachers' statements about argumentation in mathematics, on the other hand, suggest that students need to know the mathematical content prior to engaging in argumentation. For instance, "I didn't [engage them in argumentation] because of understanding …they were not intellectually ready for that concept" (Bill, Int. 2).

Teachers' beliefs about different epistemological underpinnings of mathematics and science, along with contextual constraints, led to different beliefs and intentions for practice with respect to argumentation in these disciplines. The contextual constraint of testing and the amount of curriculum the teachers perceived as essential focused more attention on the teaching of mathematics, which could be seen as benefiting student learning of mathematics. On the other hand, the perception of science as involving wonder, curiosity, and inherently positive and interesting ideas may lead to the creation of a more positive learning environment for the teaching of science. These questions remain open and need to be studied further: What are the consequences of perceiving argumentation in mathematics as limited to concepts already well-understood? Can integrating the teaching of mathematics and science lead to more exploratory and inquiry-based teaching of mathematical ideas alongside scientific ones?

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