USING MANIPULATIVES AS GENERATIVE MECHANISMS FOR EXPLAINING MATHEMATICS PHENOMENA

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What does it mean for preservice teachers to learn about using manipulatives for teaching children mathematics? How might teacher educators work with student teachers in order to meet the challenges posed by using manipulatives for teaching in their mathematics methods courses? In a research-based preservice mathematics methods course for elementary preservice teachers, we spent a significant amount of time working with concrete materials to model arithmetic operations. To be consistent with the practices in the methods course, part of the final assessment for these preservice teachers was an interview, during which students were asked to show how they would work with the materials, verbalize their actions, and symbolically record these actions. Using interviews for assessment provided an occasion for not only the preservice teachers' learning, but also for the interviewers (mathematics teacher educators) to reflect on our own practice.

Framed by the work of Maturana (2000) on observer, language and languaging, the interview strategy enabled us to focus on the coherences of preservice teachers' actions, talk and writing. Put differently, this strategy helped us to listen for the student teachers' domain of explanations. As one student teacher's interview illustrates, the incoherence of her actions with concrete materials and her verbalizing, allowed the interviewer to intervene in ways that were helpful to the student teacher.

Our reflection on how manipulatives can be used in the teaching and learning of mathematics leads us to believe that manipulatives can be used to enhance students' understanding of mathematics concepts. We propose that manipulatives can be used as generative mechanisms for explaining mathematics phenomena (Maturana, 2000). As an illustration we offer an anecdote from another episode in our teaching in which student teachers were using two sets of chips of different colors to explain mathematical operations with integers. The two colors represented negative and positive integers. Student teachers were able to use the chips to explain why negative x negative = positive. In addition, class discussions about the activities occasioned student teachers to understand an integer as both an object and a process (Sfard, 1991).

References

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