ELEMENTARY SCHOOL PROSPECTIVE TEACHERS' SOLUTIONS OF $200 \div 50 \div 10$

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It is widely agreed that students' ways of thinking, their correct and incorrect ideas, should play a role in teaching (e.g., NCTM, 2000). This paper illustrates a way to base instruction on students' reactions to mathematical tasks.

A class of elementary school mathematics prospective teachers was asked to solve $200 \div 50 \div 10$ as part of a weekly home assignment. An examination of their solutions revealed a variety of correct as well as incorrect methods that led to different results. The correct solutions included, $200 \div 50 \div 10 = (200 \div 50) \div 10 = 4 \cdot \frac{1}{10} = 0.4$, and $200 \div 50 \div 10 = 200 \div (50 \cdot 10) = 200 \div 500 = 0.4$. The incorrect solutions included, for example, $200 \div 50 \div 10 = 20\not{0} \div 5\not{0} \div 1\not{0} = 20:5:1 = 4$ and $200 \div 50 \div 10 = 200 \div (50 \div 10) = 200 \div 5 = 40$.

In order to trigger the prospective teachers to reflect on their own and on their peers' solutions, a class assignment was designed, consisting of their correct and incorrect solutions for the above task. In a 90 minutes class session, the prospective teachers were first asked to work individually and decide whether each suggested solution was correct or not, and why. Later in this session they formed small working groups, and had to discuss their ideas and come up with an agreed response to each suggested solution. Finally, each group presented its decisions to the entire class, followed by further discussions.

In the written responses and in the class discussion the prospective teachers exhibited a rule-based mathematical approach. For instance, several students claimed that "In division one can reduce the elements by cancellation" as a justification for $200 \div 50 \div 10 = 20\not{0} \div 5\not{0} \div 1\not{0}$. Some others stated that "there is no commutative law for division, hence $200 \div 50 \div 10$ cannot be computed as $200 \div 10 \div 50$ (see also Tirosh, Hadass & Movshovitz-Hadar, 1991).

Additional findings regarding the prospective teachers' criteria for accepting or rejecting the suggested solutions, and regarding the consistency of their solutions will be provided in the oral presentation.

References

Tirosh, D., Hadass, R., & Movshovitz-Hadar, N. (1991). Overcoming overgeneralizations: The case of commutativity and associativity. *Proceedings of the 15th PME Conference.* Assisi Italy: Vol. 3 pp. 310-315.

National Council of Teachers of Mathematics [NCTM]. (2000). *Principles and standards for school mathematics*, Reston, VA: NCTM.