Enhancing the Teaching and Learning of Basic Arithmetic Through Subitizing

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Abstract:

This paper examines how subitizing (recognizing a quantity and naming it without having to count the objects individually) can help develop students' understanding of basic arithmetic and how teachers' and students' actions can inform one another. Studies suggest that subitizing is underused in teaching and can be harnessed to enhance the learning of subtraction and addition because of its deep links to visualization. Pairing research that points to possibilities of using subitizing to teach arithmetic with an enactivist view of teaching, this research examines how teachers' and students' actions co-adapt. Data from short, seven- to eight-minute addition and subtraction lessons in a Grade 2 classroom were collected and analyzed with an enactivist view of teaching actions as triggers. Actions included verbal prompts, movement of small circular objects that represent numbers and hand gestures above the objects. In these lessons, teachers and students arranged small circular objects to guess/identify one another's computational strategies to arithmetic questions. Our findings suggest that teacher actions triggered and were triggered by students' subitizing capabilities and occasioned making connections between number (de)composition and operations. Teachers' actions were contingent on students' actions as they repeated, enhanced or changed their actions. Triggered by teachers' actions, students were able to use subitizing to describe their computation strategies instead of counting to combine and/or form large values and to (de)compose, add or

subtract values. This research recommends the use of subitizing to make arithmetic strategies visual and calls for more research on the co-emergence of teaching and learning in mathematics classrooms.

Keywords: mathematics education; enactivism; subitizing

Biographical Notes

Parinaz Nikfarjam is a doctoral candidate at York University, where she also teaches mathematics education courses to pre-service teachers. Parinaz has been an educator for over seventeen years, working as elementary teacher, department head and vice principal. She is particularly interested in classroom research.

Tina Rapke is an associate professor in the Faculty of Education at York University. She specializes in mathematics education. She spends her time in school mathematics classrooms and in university classrooms teaching in-service teachers and future mathematics teachers. Dr. Rapke views her teaching and research as seamless and complementary.