

Promoting children's number sense

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Number sense has been a focus of the mathematics education in about ten years. And, in recent years, instructions have focused on promoting number sense in the domain of numbers and calculations at elementary schools in Japan. These instructions have reflected on old instructions for the acquisition of formal calculation skills. Performing calculations quickly and correctly is completely different from performing calculations using many kinds of methods flexibly or seeing numbers in various ways. If the instructional aim is one of these, the other one can not be achieved automatically. In other words, we have to aim at qualitative improvements in such capabilities so that children can utilize meaningfully numbers and operations and can solve problems effectively.

Children come to treat numbers in various contexts before entering school, and have naive knowledge concerning numbers. In school, they are expected to develop rich knowledge about numbers, to perform well with numbers or calculations in mathematics. A rich number sense can not develop only within a certain one domain or in a fixed time period. Such a sense is developed gradually and refined in various activities involving numbers and calculations. Furthermore, a rich number sense cannot be directly taught as a certain fixed procedure. The number sense of children can only be developed after they recognize the merits of calculation methods or the necessity of using them. For example, the following important points can be mentioned in calculation instructions.

- Do not focus only on performing calculations quickly and correctly.
- Do not focus only on whether calculation results are correct or not.
- Have children develop their own calculation methods.
- Put a child's original way of thinking as the basis of the instructions.
- Provide a lot of opportunities for children to experience and compare various calculation methods.
- Provide a lot of opportunities for children to apply trial-and-error methods using various calculation methods.
- Provide the opportunity for children to recognize the necessity of examining calculation results.

Each of the above-mentioned important points is apparently very common. In spite of this, it is very difficult to implement these points in daily classrooms or everyday life. The amount of daily activities has a serious influence, making it difficult to promote such a number sense.