A COGNITIVE APPROACH TO
MATHEMATICS EDUCATION

MEIR BEN-HUR

International Renewal Institute
Chicago, USA

Abstract: The early gaps in children’s cognitive abilities may not necessarily be large, but inattention on the part of mathematics teachers to those gaps bears severe consequences in the children’s future learning. What makes it difficult is that known fact that it is always possible that the difficulties students have with mathematics are masked by the appearance of rote learning, because students who are not developmentally ready to learn certain concepts have little recourse but to memorize and reproduce what they are told. It is therefore critical that teachers recognize the importance of a cognitive approach to mathematics education and regularly analyze their students’ errors and their students’ learning. In this paper I first analyze the cognitive challenges of mathematical thinking, particularly at the primary school levels. Then I offer the example of number sense to illustrate how the number sense is cognitively challenged.

The importance of cognition in mathematics cannot be underestimated. From kindergarten on, the typical mathematics curriculum involves six critical cognitive operations and structures.

a. conservation
b. representation;
c. allocentric thinking;
d. spatial abilities and the sense of time,
e. projection of virtual relationships, and
f. self-regulation, focused, and systematic exploratory behavior;

These six critical and highly interdependent cognitive operations and structures develop in children gradually, through mediated manipulation and movement among objects, from infancy and beyond childhood. These operations and structures are briefly defined below:

Conservation

Conservation refers to the cognitive ability to judge changes through logical deduction rather by appearance (Cockcroft e.a., 2002). It is manifested in the conception of number that is flexible enough to include all the possible

1 meirbh@aol.com