

ZMATH 2012a.00170

Van Dooren, Wim; De Bock, Dirk; Verschaffel, Lieven

From addition to multiplication ... and back: The development of students' additive and multiplicative reasoning skills.

Cogn. Instr. 28, No. 3, 360-381 (2010).

Summary: This study builds on two lines of research that have so far developed largely separately: the use of additive methods to solve proportional word problems and the use of proportional methods to solve additive word problems. We investigated the development with age of both kinds of erroneous solution methods. We gave a test containing missing-value problems to 325 third, fourth, fifth, and sixth graders. Half of the problems had an additive structure and half had a proportional structure. Moreover, in half of the problems the internal and external ratios between the given numbers were integer, while in the other cases numbers were chosen so that these ratios were noninteger. The results indicate a development from applying additive methods “anywhere” in the early years of primary school to applying proportional methods “anywhere” in the later years. Between these two stages many students went through an intermediate stage where they simultaneously applied additive methods to proportional problems and proportional methods to additive problems, switching between them based on the numbers given in the problem.

Classification: C30 F90 D70

Keywords: numbers; word problems (mathematics); mathematical logic; problem solving; arithmetic; elementary school mathematics; age differences; mathematics skills; thinking skills; research; primary education; lower secondary; transfer of training; student errors; learning
doi:10.1080/07370008.2010.488306