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Designing innovative learning activities to face difficulties in algebra of dyscalculic students: exploiting the functionalities of AlNuSet.

Leung, Allen (ed.) et al., Digital technologies in designing mathematics education tasks. Potential and pitfalls. Cham: Springer (ISBN 978-3-319-43421-6/hbk; 978-3-319-43423-0/ebook). Mathematics Education in the Digital Era 8, 193-214 (2017).

Summary: In this chapter I discuss students' difficulties in algebra, considering in particular those students affected by developmental dyscalculia (DD). Focusing on algebraic notions such as unknown, variable, algebraic expression, equation and solution of an equation, I will describe possible processes of meaning making in students with low achievement in mathematics, or even diagnosed with DD including adult learners. This involves considering algebra not only in its syntactic aspects but also in its semantic ones. The assumption on which the work is based, is that some difficulties in learning algebra could be due to the lack of meaning attributed by the students to the algebraic notions. Basing the analyses on studies both in the domain of cognitive psychology and in the domain of mathematics education, I will show how students with DD can make sense of the algebraic notions considered above, thanks to tasks designed within AlNuSet exploiting its semiotic multi-representations based on visual, non-verbal and kinaesthetic-tactile systems. AlNuSet (Algebra of Numerical Sets) is a digital artifact for dynamic algebra, designed for students of lower and upper secondary school.

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