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Transformation as a fundamental concept in arithmetical competence modelling: an example of informatical educational science.

Rezat, Sebastian (ed.) et al., Transformation – a fundamental idea of mathematics education. New York, NY: Springer (ISBN 978-1-4614-3488-7/hbk; 978-1-4614-3489-4/ebook). 349-386 (2014).

Summary: Interpreting calculations as sequences of transformations on arithmetical expressions, like 3×12 , opens new opportunities for understanding and modelling arithmetical competence. Arithmeticus is a computer program that produces sequences of transformations, which can be applied to arithmetical expressions. It can analyse the sequence of transformations used in a student's calculation, store them and try to apply them on other expressions. In this paper it will be explained how these features are a basis of a dynamic model of arithmetical competence. Additionally, informatical educational science will be proposed as a special approach of investigating learning and teaching processes by informatical methods: in the case of Arithmeticus, by the dynamical modelling of arithmetical competence and learning and teaching processes.

Classification: F30 U70 M50 P50

Keywords: algorithm; arithmetic; arithmetical skills; arithmetical strategy; artificial intelligence; calculation; informatical cognitive model; cognitive psychology; competence; competence modelling; educational software; generative models; informatical educational science; informatical model; informatics; intelligent tutors; mathematical activity; modelling calculations; student modelling; transformation

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