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Exploring students' mental models in linear algebra and analytic geometry: obstacles for understanding basic concepts.

Nicol, Cynthia (ed.) et al., Proceedings of the 38th conference of the International Group for the Psychology of Mathematics Education "Mathematics education at the edge", PME 38 held jointly with the 36th conference of PME-NA, Vancouver, Canada, July 15–20, 2014, Vol. 5. [s. 1.]: International Group for the Psychology of Mathematics Education (ISBN 978-0-86491-360-9/set; 978-0-86491-365-4/v.5). 121-128 (2014).

Summary: We discuss the relevance of 'Grundvorstellungen' (GVs), a didactical category to analyze students' mental models in comparison to the intended mathematical meanings in the context of linear algebra and analytic geometry. Diagnostic tasks were used to reveal students' conceptual understanding in this field of expertise. In particular, an open item format was chosen to elicit students' individual GVs and to explore how they use them while working on mathematical tasks. 30 students from upper secondary school participated in our study; data was collected by a paper-and-pencil test. The results show that elaborated representations of GVs foster students' understanding of mathematics and facilitate the process of finding problem solving strategies.

Classification: H64 G74 C34

Keywords: mental models; linear algebra; analytic geometry; mathematical concepts; obstacles; difficulties