

Kolloquium des Instituts für Mathematik und Informatik

Koordination: Prof. Dr. Sebastian Kuntze

... demnächst:

am 27.07.2011 um 12:30-14:00 Uhr in Hörsaal 5.211

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The role of examples in establishing the validity of universal and existential mathematical statements

Zusammenfassung/Abstract:

A tension between empirical and formal aspects of mathematics has been broadly recognized as one of the major sources of students' difficulties with proving. This tension can be seen in students' tendency to rely on specific examples as sufficient for determining that a general claim is true; or to treat counterexamples as exceptions.

Such manifestations suggest that understanding of the logical relations between examples and statements is a non-trivial accomplishment for students. However, this kind of understanding is not usually addressed explicitly in school curriculum. The nature of this understanding has not been fully conceptualized, nor has it been studied systematically prior to this study.

The purpose of the study was to examine students' understanding of the logical relations between mathematical statements, examples and proving. For the purpose of the study, a conceptual framework describing different aspects of these relations was developed. It provided the basis for designing special types of mathematical tasks that assess students' understanding and facilitate its development. These tasks (in algebra and in geometry) were implemented with six pairs of top-level high-school students in two Israeli schools. Each pair participated in a series of six task-based interviews.

The findings provide a complex account of students' understanding of the roles of examples in proving and reveal various inconsistencies in their understanding. At the same time the findings point to different aspects of strength in students' reasoning and to possible developments in students' understanding of the logical relations between examples and proving, due to their interactions with mathematical tasks.