STUDENTS' REASONING IN THE CLASSROOM: AN APPROACH FOR ANALYSIS

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Lithner's (2008) reasoning framework differentiates students' reasoning based on whether or not it is novel to the students, and whether it contains arguments that are grounded in intrinsic mathematics. Experimental studies applying that framework have shown that the type of reasoning students use during practice will influence their performance on later tests (e.g., Jonsson, Norqvist, Liljekvist, & Lithner, 2014).

Building on this important finding, we argue that the research field would benefit from a better understanding of how reasoning is related to making progress when solving mathematical tasks. This study addresses this challenge by means of developing an approach to study how reasoning is related to making progress when solving mathematical tasks. Additionally, whereas the experimental studies were carried out in a laboratory setting as set out by researchers, the current study was carried out in students' natural habitat, the classrooms, and the tasks students were working with were selected by their teacher.

We built on the same reasoning framework as in the abovementioned studies (Lithner, 2008) to characterize students' reasoning as well as the tasks' reasoning potential.

The reported approach is based on analysis of four transcribed group conversations of upper-secondary school students when solving tasks, pictures of their notes, and clarifying post-interviews with the students. The approach consists of the following six steps: 1) analysis of crucial mathematical aspects of the task that the students have to solve, 2) break down students' solution into subtasks, 3) characterize reasoning potential of subtasks, 4) characterize students' reasoning when solving subtasks, 5) determine progress of subtask compared to previous subtask, 6) plot in a visual representation. Applying this approach helped to form first hypotheses as to the relationship between students' reasoning and making progress when solving mathematical tasks.

References

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