

ARGUMENTATION PROCESSES: STRUCTURE AND QUALITY

Julia Cramer¹, Angelika Bikner-Ahsbahs¹, Raz Harel²

¹University of Bremen, ²Tel Aviv University

The presentation of the short oral will be concerned with combining Toulmin's scheme (Toulmin, 1958) and Ottmers's topical schemes (2007) in order to get a tool for investigating the development of students' argumentation from its very beginning as everyday argumentation to more strengthened mathematical inferences.

School children bring with them experiences of everyday argumentation into math classes upon which learning to argue and prove mathematically is built. However, we do not exactly know how mathematical argumentation emerges out of everyday argumentation. The Toulmin scheme is an appropriate tool to reconstruct the structure and depth of argumentation processes dividing it into its parts concerning their functions: data, conclusion, warrant, backing and operator. To grasp everyday argumentation methodically, a look at philosophy and at rhetoric is worthwhile: Ottmers presents a collection of topical schemes describing the quality of inferences from data to conclusion (warrant). This collection is divided into two prime classes: everyday logical schemes and convention-based schemes. Everyday logical schemes are redolent of formal rules. In contrast, convention-based conclusions do not use any kind of logical structures. They are established within a group based on norms. An example for this prime class is an authority-based conclusion that refers to another person accepted as authority within the group. The everyday logical schemes contain five types: causal-based, comparison-based, contrast-based, classification-based and example-based conclusions. With the help of these everyday logical schemes we can identify the starting point of mathematical inferences and investigate how mathematical inferences develop. This development is linked to the structure and depth of argumentation processes by the use of Toulmin's scheme, and to constructing knowledge by the use of an epistemic action model that describes the construction of mathematical knowledge. We expect that argumentation gains mathematical strength if it becomes deeper or serves to justify new knowledge constructs. In the short oral, an example will illustrate how the tool described above leads to deepened insight about the progressing quality of mathematical argumentation processes.

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References

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