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Coherence and consistency: Sibling principles in the practice of research.

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Whereas coherence is about the *compatibility of different parts in the same whole* consistency is the *congruity with what has been previously or elsewhere shown or stated.* In any scientific discipline and so in mathematics education, theories are important coherent entities and consistency is a regularity principle for scientific argumentation in general. However, what counts as theory in mathematics education, is not so clear and this ambiguity spreads to scientific argumentation that may raise struggling with coherence and consistency in research practice.

In my talk, I will first discuss notions of theory in mathematics education and their roles when building a coherent framework for empirical research. Then two examples are presented to distinguish two types of frameworks, a *theoretical framework* and a *conceptual framework*. Example 1 shows a study of how two theories are linked to solve a problem of inconsistency leading to a coherent expansion of both theories by identifying a common principle in the phenomenon of a *teacher and a student interacting on incompatable levels of knowing*. Example 2 shows a conceptual framework for investigating the *learning of the division of algebraic equations with a digital learning system*. Both types of frameworks can be made coherent but in different ways and for different purposes. Comparing these two frameworks based on the concrete examples may elucidate their advantages and disadvantages for framing research as well as how they may contribute to further the knowledge of mathematics education in a coherent and consistent manner.

In a final step, I will use the two examples as pragmatic resources for the practice of teaching and learning about (1) the *epistemological gap* between teacher and students to be bridged in teaching and (2) the nature of the processes of learning with a didactical model to be considered in the planning and conducting of teaching in class.