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Plenary: Misconceptions About Misconceptions: New Views on Teaching the Hard Stuff

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Despite the substantial body of “misconceptions” education research literature, the development of an actionable theory of conceptual change to mitigate students’ misconceptions continues to be less than satisfying. What if a new, action-oriented cognitive model allowed us to deeply probe and more efficiently operate on students’ learning difficulties in a fruitful manner? We propose that instead of binning all erroneous student thinking into a single misconceptions construct, which leads to prescribing only a single instructional strategy, perhaps it is time for a new model focusing on “misconceptions” as a mixture of at least four learning barriers: incorrect factual information, inappropriately applied mental algorithms (phenomenological primitives), insufficient cognitive structures (e.g. spatial reasoning), and affective/emotional difficulties. Each of these types of barriers can then be targeted more effectively by education researchers and be more efficiently addressed with an appropriately aligned instructional strategy.