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Abstract or Concrete: Which is better for learning and transfer?[1]

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A common educational assumption is that learning is facilitated when knowledge is expressed in a concrete form, such as with rich examples or manipulatives. In addition, many educational curricula use multiple representations, some with varying degrees of concreteness, to aid in learning and transfer. However, there are reasons to call into question the effectiveness of concrete representations. In a series of experiments, we study the effects of concreteness on both learning and transfer. Both undergraduates and sixth graders learned the rules of a simple algebraic group, which has many isomorphic and "real life" instantiations. The instantiations learned and tested differed only in the amount and/or kind of concreteness. Results indicate that there are important tradeoffs in both learning and transfer between abstract and concrete representations, and that at least in some cases the learning of multiple representations does not change this conclusion.

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