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Varying Effects of Subgoal Labeled Procedural Instructions in STEM Learning

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Abstract: This study discusses differences in problem solving performance among different domains presumably caused by the same instructional intervention. Discipline-based education research (DBER) acknowledges similarities in learners' cognitive architecture that allow interventions to transfer among domains, but it also argues that each domain has characteristics that might affect how interventions impact learning. The present study uses an instructional design technique that had previously improved learners' problem solving performance in programming: subgoal labeled procedural instructions and worked examples. The present study explores the effect of this technique for solving problems in statistics and chemistry. The problem solving procedures in the three domains have different characteristics. Similarly, each of the three experiments has a different pattern of results for problem solving performance. This study concludes that subgoal labeled worked examples seem to be equally effective across the different domains. Subgoal labeled procedural instructions, however, seem to be most effective for more complex procedures.