Interactive diagrams reduce the split-attention effect in geometry

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Abstract: In geometry, students are frequently required to split their attention across verbal and visual information. We measured the impact of the split-attention effect on geometry problem solving by analyzing log-file data generated by students who used two versions of Carnegie Learning's intelligent tutoring system for geometry. The original version split students' attention across a table and diagram, while the revised version integrated the same information into a single interactive diagram. Although the number of hints and errors remained comparable (Cohen's d = -.05), students using the revised version (M = 9.30 min., SD = 8.23) spent significantly less time solving each problem than those using the original version (M = 11.77 min., SD = 14.85), $F(1, 9361) = 92.64$, $p < .001$, d = .20. Reducing the split-attention effect therefore increased problem-solving efficiency. Our findings illustrate how instructional technologies can be improved through the application of cognitive science principles.