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A framework for characterizing student understanding of Riemann sums and definite integrals.

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Summary: It has been shown in the literature that students can often evaluate definite integrals by applying the fundamental theorem of calculus or by interpreting an integral as an area under a curve. However, students struggle to solve word problems involving definite integrals, even when the context is quite familiar to the students. This research examines the obstacles calculus students encounter and the ways in which they overcome those obstacles when solving definite integral problems without relating to area under a curve. A framework for characterizing student understanding of Riemann sums and definite integrals is presented and discussed. Results indicate that conceptualizing the product of $f(x)$ and Δx proves to be the most complex part of the problem-solving process, despite the simplicity of the mathematical operations required in this step.

Classification: I55 C35 M55 D55

Keywords: calculus; definite integral; Riemann sum; student learning; structuralism

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