Redefining Integral: Preparing for a New Approach to Undergraduate Calculus

Preliminary Research Report

Abstract: This study is a pilot to a larger design research project that aims to explore an alternative approach to teaching a Calculus I course. Central to this approach is the introduction of the integral first, utilizing a non-standard definition, but which is equivalent to the standard definition. This is immediately followed by the introduction of derivative. This approach allows methods of derivation and integration, which are analogs of one another to be introduced in close succession, allowing the relationships between these methods to be a major theme of the course. The alternative definition of integral is the focus of this study. I present preliminary results of a teaching experiment that explores how students develop an understanding of this alternative definition of integral and how these understandings relate to prerequisite notions, such as area and arithmetic mean.

Keywords: Calculus, arithmetic mean, new methodology, teaching experiment.