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Kirk Weller* (wellerk@umflint.edu), Department of Mathematics, University of Michigan Flint, Flint, MI 48502. *Study of the Cognitive Relation Between an Infinite Decimal and the Real Number It Represents: How Does an Individual Understand the Truth or Falsity of the Relation $0.999\dots = 1$?*

Many pre-service elementary teachers see the equality $0.99\dots = 1$ as false. This motivated development of an APOS analysis of repeating infinite decimals. Based on the analysis, a pedagogical approach using APOS Theory, the ACE Teaching Cycle, and ISETL was developed and implemented. In the instruction students develop a repeating infinite decimal as a process; encapsulate that process into an object; realize that the object created by the encapsulation is either an integer or a fraction; and learn methods for identifying the fraction or integer to which the decimal corresponds. Acceptance of the equality $0.99\dots = 1$ is a special case of students' understanding. The instructional treatment was tested in university pre-service content courses. When compared to students who did not receive the instructional treatment, students in the experimental sections showed gains in their understanding of infinite decimals and the relationship between $0.99\dots$ and 1. (Received September 26, 2006)