Fractions are notoriously challenging for students to learn with understanding. Research indicates that students frequently memorize rote algorithms for fraction operations without building conceptual knowledge of underlying ideas. We conducted research with a group of four rising fourth-graders. The purpose of our study was to investigate students' understanding of fraction equivalence and design an instructional sequence to help it develop. Instructional design was guided by an iterative cycle in which we qualitatively analyzed students’ reasoning after each lesson in a seven-lesson sequence and refined our teaching approach based on the analyses. Our nine-week study included individual pre-assessments which allowed us to determine individual students’ learning needs, and post-interviews were conducted at the end of the study to assess student growth. Weekly teaching sessions were video recorded and then transcribed verbatim to allow critical analysis to discover areas we could improve upon as educators and to identify points that the students needed to better understand. These observations informed our instruction each week. We found that all students steadily improved in their abilities to give conceptual explanations during the study, yet most of them struggled to create equivalent fractions that could not be doubled or halved. We found that the use of discrete manipulatives encouraged students to explore visual representations that were unable to be doubled and using unlike denominators encouraged students to explore splitting fractions into groups larger than halves. From our findings, we recommend the use of discrete manipulatives to introduce and reinforce student knowledge of creating equivalent fractions.