The purpose of this study was to establish the reliability and validity of the construct map for students’ conception of equivalence with special emphasis on investigating the impact of structure of equation on students’ conception of equivalence. The study examined the role of structure of equations in identifying students’ conception of equivalence; specifically, in regard to the role of place value and position of an unknown in an equation. An equivalence assessment was designed which comprise items of different numeric structures to assess knowledge associated with each level of construct map.

A mixed method sequential explanatory design was used. In the first phase, 114 second and third grade students participated in a written equivalence assessment. Based upon students’ performance on the written assessment, 9 students from the first phase were selected to participate in one-on-one clinical interviews. Results from the quantitative phase provide evidence for reliability and validity of the equivalence assessment. Results suggest that the place value and position of the box in equivalence equations play a significant role in adequately assessing students’ level of conception of equivalence. Qualitative findings aided in identifying and describing the cognitive processes underlying the students’ responses on the written assessment items and provide
confirmatory evidence for validity. These results provide useful guidelines for instructors and curriculum designers. Specifically, findings suggest more attention be paid to the role of place value in the teaching and learning of equivalence.