Abstract
Chemistry graduate students primarily teach undergraduate courses and often have more contact hours with students than do faculty. Many graduate students do not teach beyond the first year and new graduate students arrive with differing levels of teaching experience and expertise. For these reasons, we are interested in understanding the unique nature of graduate students knowledge for teaching and how it is developed. We investigated the development of graduate students knowledge for teaching several foundational organic chemistry topics including chromatography, solubility, concentration, acid-base chemistry, and spectroscopy using questionnaires that were designed to elicit both content knowledge and pedagogical content knowledge. Cognitive interviews were also performed with a subset of participants to uncover the origin of their knowledge. Data from the test instruments were transformed using the Rasch model and statistically analyzed. Our analysis showed that graduate students at all levels of experience performed well on content knowledge questions, but even experienced graduate students demonstrated low levels of pedagogical content knowledge. Importantly, experienced graduate students demonstrated a greater proficiency than novices, which suggests that teaching knowledge is developed over time, even in the absence of professional development opportunities.