The aim of this research is to determine what differences may exist in students' structural knowledge while using a variety of concept mapping assessments. A concept map can be used as an assessment which connects concepts in a knowledge domain. A single assessment may not be powerful enough to establish how students' new knowledge relates to prior knowledge. More research is needed to establish how various aspects of the concept mapping task influence the output of map creation by students. Using multiple concept maps and pre-instruction and post-instruction VNOS instruments during a 16-week semester, this study was designed to investigate the impact of concept map training and the impact of assessment design on the created maps. Also, this study was designed to determine what differences can be observed between expert and novice maps and if similarities and differences exist between concept maps and an open-ended
assessment. Participants created individual maps and the maps were analyzed for structural complexity, overall structure, and content. The concept maps were then compared by their timing, design, and scores.

The results indicate that concept mapping training does significantly impact the shape and structure complexity of the map created by students. Additionally, these data support that students should be frequently reminded of appropriate concept mapping skills and opportunities so that good mapping skills will be utilized. Changing the assessment design does appear to be able to impact the overall structure and complexity of created maps, while narrowing the content focus of the map does not necessarily restrict the overall structure or the complexity. Furthermore, significant differences in structural complexity were observed between novice and expert mappers. The fluctuations of NOS concepts identified in student created maps may suggest why some students were still confused or had incorrect conceptions of NOS, despite explicit and reflective instruction throughout the semester.