

## CONCEPT MAPPING TEST AS A NEW DIAGNOSTIC TOOL FOR THE ASSESSMENT OF STUDENTS' COMPETENCES IN SCIENCE EDUCATION

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**Abstract.** In the context of a large-scale education policy reform project in Switzerland, educational standards based on competency models have been developed for grades 2, 6 and 9. A primary validation of these standards was part of the development process. As described elsewhere (Ramseier et al., 2012), some questions concerning validity and reliability of the performed tests remain open. To close this gap, we developed a detailed framework for the evaluation of one segment of the competency model: the competencies of "Ordering, Structuring and Modeling" (OSM) in the content domain of "structure and properties of matter". Based on this framework, which combines the concept of hierarchical complexity (Bernholt et al., 2011; Commons et al., 1998) with a theoretical analysis of the competencies in the area of OSM, a computer-based Concept Map Test (CMT) has been developed and tested during 2014-2016. In addition to the CMT, students were administered corresponding Multiple Choice Test (MCT) in order to investigate the validity the results obtained through the Concept Map items. Teachers from Northwestern Switzerland (German speaking part) were selected as willing to test their classes on the Concept Map-Test giving 288 students in total in grade 8 and 9. Rasch Analysis was used to investigate instrument functioning and to determine linear measure of person abilities and item difficulties. Additionally, standardized tests were used to assess cognitive skills and reading comprehension. The results suggest that Concept Map items are in fact suitable to assess selected competencies of "Ordering, Structuring and Modeling" in the content domain of "structure and properties of matter", but some issues remain in terms of instrument development and improvement of fitting some items to our competency model. Since this research project is still in progress, the following questions will be addressed in presentation for discussion: 1) How does Concept Map Test compare to a classical Multiple Choice Test? 2) Is Concept Map task format as a diagnostic tool suitable for all students equally good?

### References

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