# Development and Validation of a Basic Chemistry Concept Inventory Assessing Secondary School Students

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Educational research has highlighted the importance of students' prior knowledge in subsequent learning[1]. Thus, many chemistry concept inventories assessing students' chemistry understanding and measuring learning progression have been developed and proposed in the literature.[2]·[3]·[4] However, considering the great diversity of content and context of the chemistry curricula taught internationally, there is a need for broadening the inventories' base for chemistry educators and teachers. In such a perspective, the existing inventories should be used as a "starting point" for the development of an open item pool for a reliable and efficient assessment of secondary students' chemistry understanding.[4]

The present study describes the development of an inventory which was purposely designed to assess the extent to which students grasp basic chemistry concepts from a conceptual change perspective, as well as to detect the level of basic chemistry concepts misconceptions held by secondary students. The proposed Basic Chemistry Concept Inventory (BCCI) consists of 36 multiple-choice items, which cover "central" chemistry concepts and ideas in the secondary school chemistry curriculum (e.g. combustion, acids and bases). The content validity of the BCCI was tested by a group of science educators (in-service chemistry teachers and researchers). The group of experts evaluated the clarity of each item of the inventory. They also provided verification that the 36 items adequately examine certain basic concepts of the Chemistry curriculum at the Secondary level. The 36 items were pilot tested with 54 eleventh grade students, ranging in age from 16 to 17 years. The inventory test was administered to students in a paper and pencil form. During the completion of the inventory, students were asked to express their views about the consistency, the clarity, the difficulty, and the relevancy of each one of the 36 items of the inventory regarding their experiences and chemistry knowledge.

The data received from both the experts' evaluation and the pilot testing of the inventory indicated that the omission of six items out of the 36 was necessary. The revised version of the BCCI with 30 items has been recently administered to 271 eleventh grade students. The analysis of students' responses to the revised BCCI has indicated the adequate reliability and the validity of the inventory. To sum up, this study suggests that the use of the proposed inventory is a useful tool for teachers for organizing transformative instructional approaches and assisting conceptual change in their students.

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