1 - Learning Science: Conceptual Understanding | Empirical

SP - (15680) - DRAWING AN ATOMIC MODEL: STUDENTS' MENTAL MODEL DEVELOPMENT IN MODELLING-BASED LEARNING

Song Xue (United Kingdom)[1]; Chin-Fei Huang (Taiwan)[2]; Jinglu Zhang (United Kingdom)[3]

1 - University of Dundee, School of Education and Social Work; 2 - National Kaohsiung Normal University, Graduate Institute of Science Education and Environmental Education; 3 - University of Bristol, School of Education

Short Abstract

The drawing of models is important for learners and scientists alike, such as explicating the mental model development when leaning unobservable concepts. The purpose of this study was based on students' drawing to observe how modelling-based instruction affects students' mental model development while learning the atomic structure. 137 tenth graders participated and were randomly assigned to two groups. One group (n=68) was engaged in the modelling-based instruction (MBI) and the other group (n=69) without MBI. Students' drawings analysis from two groups was carried out on three modelling phases: generating models (GM), evaluating models (EM) and modifying models (MM). Based on a pre-posttest experimental design, the results show: (1) After participation in MBI, modelling group outperformed in GM than students in non-MBI but no difference in other phases. (2) Student illustrations of atomic models revealed their difficulties in understanding atomic concepts and participating in scientific modelling. Based on these findings, it is suggested how to improve the mental model of students in learning scientific knowledge in future design and implementation of modelling activities.