

Paper Number: 3815

Developing a low cost crystallography workshop for learners

Reinhardt, T

University of KwaZulu-Natal Science and Technology Education Centre (STEC@UKZN), Private Bag X 54001 Durban 4000, reinhardt2@ukzn.ac.za

Every year Science Centres around South Africa are faced with the challenge to design activities revolving around an “International year” theme. Specific sciences on which an “International Year” focuses need to be promoted to learners and the public.

The Science and Technology Education Centre at the University of KwaZulu-Natal (STEC@UKZN), which includes the Geology Education Museum, used the “International Year of Crystallography” theme as an opportunity to develop a workshop to promote crystallography, a subject often neglected in South African Science Centres.

Science Centres main clientele are learners who spend a limited time in the centre. Therefore one of the requirements for the workshop was that we would be able to complete the workshop within 60-90 minutes. It also needed to be low cost, not computer-dependant, hands-on and suitable for South African higher-grade learners.

Research on the International Year of Crystallography website revealed that the education material offered was not always suitable for the age group we wanted to target or they were too time-consuming such as the crystal growing activities. We therefore decided to design our own workshop around the theme. As crystallography includes many different aspects such as symmetry and crystal structures we needed to focus on a particular facet.

What we wanted the learners to appreciate is that minerals have a three-dimensional crystal structure and that the crystal structure in combination with the chemical composition determines what type of mineral it is. We also wanted them to understand the process of how one obtains information about crystal structures.

Mineralogy and in this case the understanding of crystal structures of minerals covers abstract concepts of chemistry where learners are requested to understand atomic or molecular structures in three-dimensions, concepts that learners and even University students have difficulties in grasping ([1], [2]). It has long been recognized that physical three-dimensional models of crystal structures are useful tools to help learners visualize these structures. We therefore decided to let them rebuild the crystal structure model of an “unknown” crystal and compare the model to a variety of other structures in order to determine what the unknown crystal was. Ball-and-stick models are routinely used in teaching at high school or university level, and ball-and-stick kits are available to build these models in groups. Unfortunately, such models come at a price. As one of our requirements was low cost we decided to use coloured sweets and toothpicks to build the models.

The workshop was introduced to over 100 learners at Scifest Africa in Grahamstown. The learners' response to this workshop was evaluated using a feedback questionnaire. We then subsequently made this workshop available to other Science Centres in the country.

[1] Ingham, A. M. and Gilbert J. K. (1991): International Journal of Science Education 3: 193-202

[2] Barke H.-D. (1993): Journal of Chemical Education 70: 968-971

