Invited Lecture

Crystallography in School?! A teachers' view

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Although the method of crystal structure analysis and working with its results offer many possible applications in chemistry, physics or biology lessons, this topic is very rarely found in school classes. From the viewpoint of a crystallographer and chemistry teacher I will try to outline some objections teachers might have to the introduction of crystallographic topics into their lessons, and I will try to suggest some ways to overcome these barriers.

Is it in the curriculum? This is a question that teachers usually ask when a new topic is proposed for the school. I will try to identify some curricular anchor points for crystallographic topics exemplary in German STEM (Science, Technology, Engineering, Mathematics) curricula. Furthermore, I will show that many general and basic competences can be promoted by dealing with crystallographic topics, e.g. the critical use of models.

X-ray diffraction is far too complicated for my students – and for me! The didactic reduction of the complex mathematical and physical fundamentals of the method should always be built on the students' prior knowledge. I will suggest different levels of reduction, from a most basic one to more advanced, and I will present material that utilises these different levels.

Are there enough specific applications for school classes? Some crystallographic applications in my own chemistry classes and in the student laboratory XLAB will be outlined, e.g. working with PDB results or with structures from the CSD Teaching Subset. The increasingly user-friendly GUIs of structure determination programs even make it possible for school students to solve and refine structures on their own.

What can be done to promote the use of crystallographic topics in the classroom? This cannot be the task of crystallographers alone. So I will finally propose a network scheme (Fig. 1) that connects the main players and their possible role in a network: Crystallographers and students, teachers, teacher students and chemistry education experts. These people should cooperate in order to achieve a sustainable anchoring of crystallographic topics in the school.

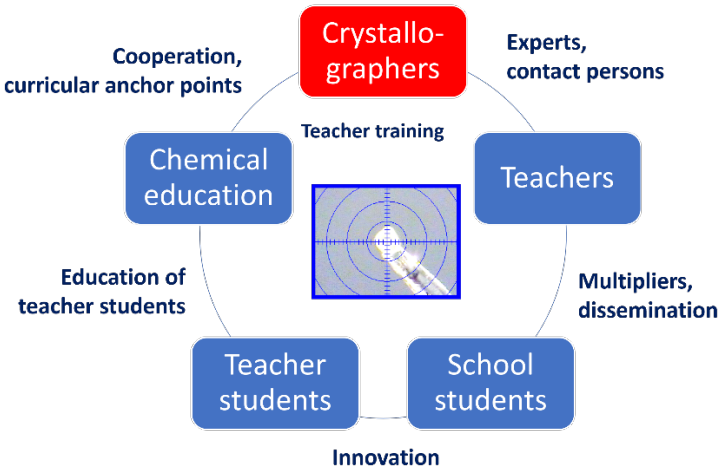

Figure 1. Network scheme for promoting crystallographic topics in the classroom