also discuss the delivery of an undergraduate course in practical X-ray crystallography. The course uses the crystallographic story arc as a means to have students reexamine their understanding of topics like stereochemistry and to better appreciate the process of scientific publication.

Keywords: education, crystallographic, information

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Chemical crystallography for undergraduate research: unexpected and fruitful results

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Research chemists at large academic institutions benefit from a wide range of in house chemical analysis tools and techniques. No chemistry department with a serious graduate research program would, for example, survive without mass spectrometry or nuclear magnetic resonance spectroscopy (nmr). However, at smaller, predominantly undergraduate institutions, adequate compound characterization is one of the most challenging aspects of running a research program. Techniques as "exotic" as polynuclear nmr or routine chemical crystallography are not always available, and collaboration with large universities for access to such instrumentation is vital. Here we discuss some examples of our work with Northern Arizona University (Flagstaff, AZ) and Millersville University (Millersville, PA), with whom we have provided crystallographic support for research in which all compounds are synthesized and crystallized by undergraduate or high school students. We will focus on how unexpected crystallographic results were used to rationalize the chemistry, and drive chemical research in a new direction.

Keywords: inorganic, coordination, sandwich

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Development of educational environment and student's life strategies

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The theory and practice of creating the required educational environment relating to teaching of crystallography is discussed aimed at effective growth of professional activity of science students.

It has been suggested by us and described a model (including transformation stages) of professional activity. This factor-analytical model has certain similarity with the Five-Factor Model (Big-FFM) theory, which is widely used in various applications in psychology, including description of psychobiological and social systems and fundamental works, connected with broader fundamental concepts of science, describing space-time and energetic aspects providing positive both state and development of personality.

The experimental data (groups of students involved in chemistry, geology and physics) on the role of the environment (educational, professional, natural) in instructor-student interactions are considered based on eco-psychological approach [1]. Among the two types of interaction with the environment are a subject-object and subject-to-subject interactions. As a result of their corresponding changes it is observed the emergence of positive personal growth, formation of an active, more conscious and clear life strategy. This process occurs both on a gradual basis and spontaneously. In today's rapidly changing world the actual result of obtained education is to assist formation of a specialist who is able to continuously improve self-development. The experience spontaneous transitions (flash of inspiration), described as self-organizing process, is also important for this.

Realization of the task of creation of educational environment is based on the known psychological and didactic principles of ensuring of educational environment for a better self-organization structure of student's personality. Among them are psychological principles in cooperative interaction, interactive lectures for instructors [2], involvement of students in research at an earlier stage, conscious goal-setting and awareness of ethical principles, i.e. a system of values for positive development.

The factor analysis has shown that their realization contributes to the growth of conscious personal position of a student, the development of personality and professionalism. The criteria of optimal life strategy and educational environment have been revealed, which make educational process more effective. It is noteworthy that many of crystallography concepts constitute an integral part of curriculum for many students involved in chemistry, physics, biology and material science. Therefore successful mastering of the crystallographic concepts and complex computer programs by the students can provide additional motivation and opportunity to begin a career of a scientist also.

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Keywords: educational environment, transformation, self-organizing development

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Fibre bundle approach to spin glass state and other magnetic structures with their symmetries

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The fibre bundle approach has been applied to derive the explicit formulas presenting all the eight fundamental magnetic structures and their symmetry groups, i.e. ferromagnetic, antiferromagnetic, simple spiral, ferromagnetic spiral, skew spiral, transverse spin wave, longitudinal spin wave and spin glass [1], [2]. The explanation of the uniqueness of the spin glass state has its roots in the appearance of the probability function p(i,j) in the second term of the assumed Hamiltonian. This term actually describes the random distribution of either dopants or defects in the ferromagnetic matrix under the percolation threshold. On this basis the Gaussian type randomness was derived for both the general global magnetic coupling constant and the magnetization vector, the latter effect bringing to the statistical features of the magnetic structure and the magnetic symmetry group of the spin glass state.

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