

Interdisciplinary education of chosen parts of natural sciences for pre-service teachers

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The preparation of pre-service teachers and the training of professionals, technicians and engineers are the main focus of new fields of study, curricula and educational approaches. The multidisciplinary elements of chemistry are emphasised in university chemistry teacher preparation programs. The aim is to educate pre-service teachers by integrating the chemical and physical disciplines through specific laboratory assignments. The above disciplines enhance the effectiveness of pre-service student-teacher preparation in acquiring pedagogical skills related to developing flexible structural aspects of teaching practices to meet a specific learning objective. The aim is to foster creativity and provide positive motivation for the science disciplines (chemistry and physics) using interdisciplinary approaches. The examples given in the paper focus on physics for chemists. Laboratory exercises are also included as an educational optimising factor based on the relationships between science disciplines. The students apply the acquired theoretical knowledge to experimental activities on a physical basis. They perform basic measurements on available laboratory instruments and evaluate the data. Laboratory exercises are an essential tool to improve the quality of education for the following reasons: the essence is practical learning and experimentation, developing as well as promoting technical and practical skills that help in the development of critical thinking and problem-solving, consequently promoting interaction and cooperation, and above all validating theoretical knowledge. Laboratory exercises in the education of pre-service teachers will help students understand chemistry and physics concepts through hands-on learning and interactive activities. Expectations, outcomes, and benefits of the laboratory exercise among the pre-service chemistry and physics teachers were orientated in the teaching: improving memorisation and understanding of physicochemical concepts and relationships through laboratory exercises and interactive activities; increasing the engagement of student pre-service teachers in the teaching process and encouraging their active participation in solving physicochemical problems; strengthening the practical skills and competencies of pre-service teachers, which can contribute to better use of modern technologies in teaching; creating a stimulating and innovative learning environment through interdisciplinary learning.

The results highlighted the importance of improving chemistry teaching, increasing student motivation, developing skills and promoting interactive learning. These implemented applications and activities can contribute to more effective and interesting teaching of chemistry and physics and support the development of students' comprehensive chemical knowledge in interdisciplinary education.

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