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Editorial

INTEGRAL METHODOLOGY OF SCIENCE TEACHING AND LEARNING

Nowadays many of us analyze ways for improving science education in many countries because the quality of science teaching is a very important aspect of education in the secondary and university levels. Science subjects are difficult for students and one of several reasons for this situation is that the teacher must use a range of appropriate teaching methods from different educational approaches in the classroom to achieve effective learning and he/she does not always have the necessary methodological bases to use these methods. Another problem of science instruction is that the teacher must teach students how to use modern learning methods in their systematic individual and group work to reach the required level of knowledge and ability.

Science teachers of the secondary (high) school or university have to manage the modern system of strategies and methods of teaching and learning to explore and adapt them to their students. These strategies and methods have to give answers for the following important questions:

1. How to design of modern curriculum of science subject?
2. How to use modern active methods of teaching?
3. How to teach students modern strategies for resolving different numerical problems in classes of science and mathematics?
4. How to evaluate correctly student's knowledge and abilities?
5. How to do science experiments in teaching with the educational effectiveness?
6. What are the modern effective ways for using Internet and computers in science instruction?
7. How to use the systemic approach in teaching?
8. How to organize correctly classes and extra class activities in science?
9. What is the integral methodology of science instruction ?

The last aspect of integral methodology is very important in this complex panorama of the active methods in chemistry teaching at university and secondary (high) school level. The problem of educational innovations in science and education can be properly treated by the analysis on this complexity on the basis of integral teaching methodology. To carry out with success the objectives of the educational process, the science teacher must have deep knowledge of the modern methodology to employ well all these methods, depending on the objectives on the classes, type on classes, topic of the course, preparation of students and other factors, that influence directly and indirectly the results of the educational work.

But only this does not guarantee the success of this difficult work. The teacher must know theoretically and practically each one of the modern active methods and to apply them correctly in practice, together with other methods. The application of one or two active methods still does not guarantee the fulfillments of the objectives and the good knowledge and skills of the students. Either it is acceptable the formal using the modern methods of the teaching, without taking into account the principal objectives that should be achieved: the deep knowledge and the creative development in students.

The integral teaching methodology is the system of all active methods that teacher uses in classes and extra class work to achieve the best learning of students. It is important that the teacher uses thoroughly these methods and chooses those that permit to him/her to fulfill better this task. For all science courses, it is recommendable to use all active forms of the classes: the conference, cooperative work, discussions, conferences and workshops together with the collective and cooperative activities (Nurrenbern, Robinson 1997; Orlik 2002, chapter 10), modern forms of examinations and other (Orlik 2002).

The experience of the best teachers shows us also (Chernobelskaia 1987, Orlik 2002, Orlik 2005), that practically in any class the teacher must apply at least 3-4 methods and active means (because the class time is short and it is not possible to use all methods and educational means), attempting to make it integrally to achieve the most adequate fulfillments of the objectives. It is necessary to carry out too the new analysis and restructuring the curriculum of the course to do this work properly.

Other essential problem is the appropriate representation of the central concepts and topics of the course, what can be done using modern systemic approaches for that (Orlik 2002, chapter 7). Modern audiovisual means of teaching together with using computers is another important alternative to traditional methods to give students the opportunities of deep understanding chemistry. But each active method should be applied by teacher with systemic links with other methods and with main objectives of the course. Together with the modern textbook and Internet resources this integral methodology can guarantee the realization of purposes of good quality science teaching and learning (Orlik 2002).

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