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Editorial

Quality of science education (VI)

Calidad de educación en ciencias (VI)

Our readers know that the quality of Science Education is a central topic in this Journal (Orlik 2000, Goodwin , Orlik 2001, Orlik 2001, Orlik 2002, Orlik 2002a). They also know that there are a lot of difficult problems to solve in the science education programs of various countries, but it's possible to find special and important points when we analyze the situation of Latin American and other developing countries compared with those of other parts of the World. We mean the real conditions and organization of the general educational system concerning to science and science education.

It's common knowledge that the system of science education of many countries has two essential subsystems: formal and non-formal science education. The first subsystem is the formal science education at primary, secondary school and higher education as well. The other one, the non-formal part is mainly connected with the popularization of science at museums, associations, science organizations and so on; and it is also linked with the many efforts for improving science education generally in the non-class activities and join forces with Ministries of Education and other parts of the formal educational subsystem. There is rather strong cooperation of the formal and non- formal parts of the science educational system and usually they share the same goals in the countries with relatively good and satisfactory results in Science education (in North America, Europe, Russia, and so on). For example, we can see the coincidence of goals and measures between formal and non-formal parts in different types of educational activities that they organize for students like Science Fairs, Olympiads, museum activities and so on.

However, the observation of the situation with the formal and non-formal science education in developing countries suggests us that both subsystems are strongly divided and there is not the necessary cooperation and coordination between them. For example, frequently there is almost no cooperation between the Ministry of Education and other science authorities like the Ministry of Science, science associations and other organizations that plan and decide on the programs of science education and popularization. We can also notice the little coordination in planning activities between the science and education authorities in the topics of science education and popularization. For example, sometimes activities in schools and science museums are separated and so on. In addition to this lack of cooperation and coordination, there is another problem that has to be taken into account: in many cases the small amount of funds that have been provided for the science education and popularization in those countries is not handled properly and with the necessary effectiveness either.

When we analyze the various positive aspects of science education in some countries, we can see that the science teacher and generally the secondary and high school teacher holds a rather high level and position in the society . This absolutely normal situation is one of the main causes for these countries to have rather good results in science education. Unfortunately in many Latin American and other developing countries, the current situation of the science teacher in society if far from good and necessary standards from the different point of view. One of the big drawbacks in the organization of science education in these countries is that the science teacher (Physics, Biology, Chemistry, Mathematics) and other subjects is not considered a central figure in society and this low status can become one of the main source of problems in the quality of science education.

Another positive aspect of the organization of education in some countries with good results in science and education is the special system they have for achieving a higher qualification level for in-service teachers. Generally this system is organized by the Ministry of Education. This important measure allows teachers to take special time for courses and to prepare themselves on modern methodologies for improving teaching and the student learning process. In some countries, this extra work preparation is organized for teachers once every 3-5 years during their professional career. A good example of organization of such systems is the former Soviet Union and current Russia. It's clear that this system of good quality organized in some countries is a strong foundation for getting good results in science education. Analyzing the present situation in many Latin American and other developing countries, we can not find strong examples of such systems for improving the level of educational qualification of in-service teachers. In some countries, many science and other teachers never have opportunities for such work or for updating their qualification after graduation from the special pedagogical university major (licenciatura, in Spanish) and this becomes one of the main causes of the serious problems we face with respect to the low in quality of science education in these countries.

We believe that the educational and science authorities of Latin American and other developing countries should take some urgent measures to encourage teacher development programs. Some effective ways for avoiding these negative implications on science teaching should be considered:

1. Organization of strong cooperation and coordination between science and education authorities in programs, plans and activities toward improving the science education and popularization of science.

2. To work on strategies to improve the social role and status of the science school teacher (Physics, Biology, Chemistry, Mathematics) and other subjects.

3. To organize a special system to improve level of educational qualification in Science, Mathematics and other subjects for in-service primary and secondary school teachers.

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Y.Orlik