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Materials Science Education: an Excellent Opportunity for Pan-American Cooperation

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Abstract – Science education in the Americas is analyzed, necessities and opportunities for academic cooperation are highlighted. Advantages of materials science as interdisciplinary, highly applicable education field are characterized. The Materials World Modules project, developed in USA and already introduced in Mexico, is presented. Potentialities and challenges associated with Pan-American materials science education programs are evaluated.

Regarding scientific, technological and economic development, Latin-America is behind USA and Canada. Some Latin-American countries have important universities, research centers and high-tech industries, but the general state of affairs is one of heterogeneous development, obsolete or dependent manufacture and low scientific-technological education level. Techno-economical weakness implies poverty and leads to social instability, violence and other important problems.

Are things changing for good? Yes, but slowly. A number of valuable programs for scientific education are successfully running in the region. But, as a general tendency, science education has not been prioritized as a fundamental motor for social progress. Latin-American students prefer to become lawyers, instead of chemists. We need lawyers, but our necessity of qualified and educated scientists and engineers is non-less than our needs of professionals associated with social studies. Technical formation of science teachers is weak and motivational tools are scant. Pedagogical resources for improving high-quality scholar efficiency are equally scarce.

Scientific education must be a primary factor in the regional strategy towards development.

In the mentioned scenario, materials science education represents a particularly interesting option. Interdisciplinary research is the fingerprint of state-of-the-art science and technology. And materials science may well be considered as the prototype of science integration. Every object of our daily life is made up of given materials: air and rain, our hearts and brains, computers and automobiles, everything is made of materials. Understanding materials is the key to dominate the materials world. Materials science education offer opportunities to teachers of all sciences and favors hands-on, applied, creative and highly motivational activities.

Materials science education signifies an excellent opportunity for a successful North-South cooperation leading to genuine long-lasting results.

In the present talk, the Materials World Modules (MWM) project [1] is described. The project conception and development, its application in USA and its introduction into Mexico are divulged. Current nanoscience-oriented efforts [2] are mentioned. Potential extension to other Spanish-speaking countries is considered.

The MWM project has been created at Northwestern University, under the direction of Prof. R.P.H. Chang. It is a system of high-school level science education units that work under the principles of hands-on, inquiry and design learning. All the MWM activities reinforce science integration, group work, students motivation for science and teachers professional development. The MWM system of (students' and teachers') manuals, experimental kits, internet resources and teachers training is affordable.

The MWM system has been successfully launched in Mexico. CIMAV and the Chihuahua Education Secretariat have performed the pioneering work. Today, several Modules manuals have been translated to Spanish Language, high quality experimental kits are made in Mexico, some hundreds of teachers have received training in the MWM methodology and some thousands of high-school students have coursed the MWM sequence. Results regarding motivation and knowledge gain have been excellent. Currently, experienced instructors are training new teachers from other Mexican states, to disseminate the Modules.

Under the umbrella of ICAM2009, a Pan-American MWM Workshop will take place. "Classical" (Composites) and "novel" (Nanoscience) modules will be introduced by means of practical activities. Motivated science education leaders of the Americas will find opportunities to establish long-term cooperation on MWM and in general science education programs.

[1] www.materialsworldmodules.org/

[2] www.nclt.us/