

# Professional Development for Science Teachers in Rural Middle Schools:

## A PROKSE Project Effort

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## Outline

- Why is professional development important?
- What is the PROKSE Project ?
- Focus on Rural Middle Schools
- Challenges in Professional Development
- Strategies to Address the Challenges

## Why is professional development important?

- Science and technology can transform the world. But transformations cannot be achieved without economic development. Economic development requires a base in science and technology. Development needs to be managed and sustained, e.g., development can bring pollution, resource depletion, etc. Here again science and technology comes to the rescue (<http://www.unesco.org/education/efa/>).
- In order to reach the goal of scientific literacy for all, science education faces **four** major challenges
  - i. Need to teach science appropriately to disadvantaged groups in remote/rural areas – due to lack of resources, poverty, etc. science education in remote/rural areas can't be equated to that in the economically endowed areas
  - ii. Equity and uptake of science
  - iii. Influence of emerging world political agenda on science education
  - iv. Pedagogical considerations towards attainment of scientific literacy

- Hands-on science education does not have to be expensive. Curriculum materials are the hardware of science education. An important consideration, particularly for developing countries, is that curriculum materials need to be largely self-sustaining, and not heavily reliant on outside sources of equipment and support.

[http://projects.edte.utwente.nl/smarternet/version2/cabinet/ware/Ware\\_1999.htm](http://projects.edte.utwente.nl/smarternet/version2/cabinet/ware/Ware_1999.htm)

- There exists a wealth of information related to science education. More and more agencies make this information available in an electronic format.

## What is the PROKSE Project?

- Definition - **P**eer **R**eviewed **O**nline **K**-12 (10+2) **S**cience **E**ducation
- Goal is to weave the high quality peer reviewed materials in the digital libraries into universally accessible curricula of the highest quality in the basic sciences.
- PROKSE is a broad based group and it is growing:

US: *Eric Mazur's* group at Harvard, *Erma Anderson* and *Gerry Wheeler* at National Science Teacher's Assoc, *Scott May* at Dept of Ed, *Soumya Chakravarti* at CSU-Pomona, *Dean Zollman* of Kansas State, Association of India's Development at University of Maryland, *Surajit Sen* at SUNY-Buffalo

India: *Vinod Gaur* at Indian Inst of Astrophysics, *Vinod Raina* at BGVS, *Anita Rampal* at Delhi Univ, *Sujit Sinha* of Swanirvar, *J. Shankar* of Azim Premji Foundation, *P.J. Lavakare* of IIE-India, *Ashok Khosla* at Development Alternatives, *Arvind Gupta* of Delhi, *R. Nath* at Vigyanprasar

Italy: *K.R. Sreenivasan* of ICTP

# Focus on Rural Middle Schools

- Rural children have unique surroundings
- Rural children are often working children
- Rural children often finish their education at the middle school level
- Existing curricula are not tuned to their needs



# Challenges in Professional Development - *In Situ* Resource Utilization?

- Which are the most important topics in mathematics, physics, chemistry and biology that must be covered when the teacher faces a group of children with limited school time and education that will likely not extend beyond 8th grade?
- How can the selected topics be best taught under the limiting conditions? How does one best contextualize the material given the surroundings (*in-situ* resource utilization)?
- How does one restructure the syllabi in basic sciences to be more effective in a shorter time?



## Strategies to Address the Challenges

- Digitize the available resources to construct libraries that can be accessed via memory sticks, etc
- Weave a path through the digitized resources so that the teacher can use it effectively as a learning tool
- Identify “initiation points” based upon the surroundings and try to introduce science concepts in that context (bottom-up approach) - make it obviously relevant
- Deal with language translation issues
- Work closely with rural teachers and existing educational endeavors in selected spots to develop coherent and tested study programs that will be effective in all rural environments