HOW TO IMPLEMENT IBSE IN ITALIAN SECONDARY SCHOOLS?

M. Fontechiari
School of Advanced Studies and School of Biosciences and Biotechnology
University of Camerino – Italy

THE ROCARD REPORT STRONGLY SUPPORTED INQUIRY BASED SCIENCE EDUCATION (IBSE)

IN ITALY ITS SPREAD IS STILL LIMITED, PARTICULARLY IN SECONDARY SCHOOLS

WHY IBSE?

- Italian students' low achievement and poor interest in science
- The national guidelines on the development of skills to understand the natural world and to become independent and life-long learners
- Research evidence on the benefits of IBSE in developing understanding, skills and positive attitudes

WHICH PRINCIPLES?

- Science is a set of knowledge and processes
- Scientific inquiry involves using data, but also reasoning, logic, critical and creative thinking imagination and cooperative work
- Students have to take ownership of the investigation

WHAT OBSTACLES?

ASPECTS OF SCHOOLING
- limited time
- an over-crowded curriculum
- large classes
- shortage of adequate space
- lack of equipment and resources

STUDENTS' SCIENTIFIC BACKGROUND
- no prior inquiry-based science learning
- based on passive learning

TEACHERS' GRADUATE STUDY
- focused on academic content
- referred to a specific scientific field
- based on the view of modern science
- lacking pedagogical content knowledge
- without reflecting on nature of science

WAY OF TEACHING SCIENCE
- focused on the facts of science
- teacher directed
- deductive
- leading to a limited view of nature of science
- with demonstration "cookbook" activities
- based on individual work and competitive grading

WHAT STRATEGY?

Teacher as a source and facilitator of change: a Formative Model

SOCIAL-CULTURAL CONTEXT

TRAINING COURSE

UNDERSTANDING
- ✓ Grasping the rationale of IBSE
- ✓ Experiencing inquiry at first hand
- ✓ Reflecting on nature of science

LEARNING ENVIRONMENT

SELF-REFLECTION

AWARENESS
- ✓ Analyzing own individual teaching practices and view of science
- ✓ Comparing the inquiry based approach with own individual teaching model
- ✓ Identifying what to change and why

SUPERVISED COOPERATIVE WORK

COMMITMENT

Selecting a topic and formulating goals

Planning inquiry based activities

Checking the designed activities

Conducting the activities in class

Reflecting on the process

COOPERATIVE WORK

ABILITY
- ✓ Diagnosing the "level of inquiry" supported by the previous activities
- ✓ Shifting towards higher levels of inquiry

REFERENCES

Akerson, V.L., Hanuscin, D.L. (2007). Teaching of Science throuh Inquiry: Results of a 3-Years Professional Development program. *Journal of Research in Science Teaching*, 44 (5), 653-680.

Bell, R. L., Smentana, L., Binns, I. (2005). Simplifying Inquiry Instruction. The Science Teacher, October 2005, 30-33.

Colburn, A. (2000). An Inquiry Primer. Science Scope, March 2000, 42-44.

Flick, L.B., Lederman, N. G. (2006). Scientific Inquiry And Nature of Science. Dordrecht, The Netherlands: Springer

Harlen, W., Allende, J. (2009). *Report of the Working Group on Teacher Professional Development in Pre-Secondary IBSE*. Fundacion para Estudios Biomedicos Avanzados, Facultad de Medicina, University of Chile

Holbrook, J., Rannikmae, M. (2007). Nature of Science Education for Enhancing Scientific Literacy. International Journal of Science Education, 29(11), 1347-1362.

Llewellyn, D.(2005). *Teaching High School Science Through Inquiry* (pp. 89-96). Thousand Oaks, California: Corvin Press

Rocard, M. et al. (2007) Science Education Now: A Renewed Pedagogy for the Future of Europe. Brussels: EC Directorate for Research (Science,Economy and Society).

mariange.fontechiari@unicam.it

SEVENTH FRAMEWORK PROGRAMME

PROFILES