Fostering INQUIRE through Evaluation Capacity Building

Fabio Dovigo and Vincenza Rocco

University of Bergamo
Department of Human and Social Sciences
Piazzale S. Agostino, 3, 24129, Bergamo, Italy

THE THEME OF RESEARCH AND THEORETICAL FRAMEWORK

In recent years, many international studies have underlined a worrying decline in young people's interest in science and mathematics, largely due to the way science is taught in schools. To deal with this issue, the Rocard Report (2007) strongly recommended the dissemination and integration of innovative inquiry-based education methods. Nevertheless, the problem is that compared to a great spread of project about IBSE method, evaluation of inquiry-based activities still remains rather undeveloped. Many assessments tools for evaluating the quality of IBSE activities and student's skills are currently employed but, since IBSE has proved to be a complex process, there is no "right way" to assess it (Dillon 2012). As a consequence, despite "Science in Society" projects including program monitoring and formal evaluation to determine whether the intended findings are being achieved, there is a lack of effective program evaluation as well as a lack of confidence among professionals in their ability to use evaluation in their programs (Coyle 2005). To investigate this issue, we developed an analysis of the INQUIRE project within the framework of Evaluation Capacity Building theory (ECB).

ECB is the intentional work to create and sustain organizational processes that make quality evaluation and its uses routine, involving the supply of technical skills, tools and resources to produce effective and useful evaluations which become sustainable over time (Stockdill, Baizerman, Compton 2002; Fleming, Easton 2010). In order to develop a sustainable ECB it is essential to embed evaluation into daily work practices and policies which allow the promotion of cultural change in schools. This target has been specifically stressed by the teachers and educators who participated in the INQUIRE project.

Building the evaluation capacity of individuals and groups means understanding and discussing the motivations necessary to engage in EBC, the assumptions and values supporting evaluation, the goals of assessment practices, how they contribute to effective decision making and add value to school organization. EBC fosters the active collaboration of the stakeholders involved through hands-on learning and by doing activities planned to design, implement and manage evaluation projects in an accountable way. (Preskill 2008). To this aim, we examined the monitoring process and the assessment instruments implemented by the INQUIRE project to evaluate the ability to provide staff with skills and sufficient resources to conduct rigorous and lasting evaluations. The investigation involved the analysis of documentation (forms, questionnaires, reports, manuals, and lesson plans), research with the stakeholders (interviews, focus groups), and the participation in courses, workshops, and meetings held during the project. The data collected provides an overall picture of the evaluation activities carried out by the project, offering valuable insights into the positive and critical aspects of INQUIRE related to the development of a sound evaluation capacity.

METHODS/METHODOLOGY

In our research we chose to analyse two training courses for practitioners run in Italy over the 2011-2013 scholastic years. The first course involved 14 educators and 13 teachers (5 from primary school, 8 from secondary school). The second course involved 23 educators and 19 teachers (7 from primary school, 12 from secondary school). To examine the evaluation practices used we adopted a

mixed-methods approach addressed to evaluate:

- the efficacy of the training courses and IBSE method through pre and post questionnaires, semi-structured interviews, personal diaries, portfolios of evidence, and world-cafés;
- the effectiveness of IBSE lesson plans put in action by practitioners in schools and gardens, through participant observations, evaluation forms filled in by the students, and the self-assessment forms filled in by the teachers.

The IBSE project is still in progress. However, here we offer evidence and indications arising from this first analysis.

EXPECTED OUTCOME/RESULTS

Our research shows that the INQUIRE project in Italy has contributed to building evaluation capacity in professionals, providing technical skills and resources which helped practitioners to learn from and about evaluation.

The main outcomes concern cognitive, behavioural and affective aspects, including:

- an increased understanding of evaluation as a multidimensional approach, including the awareness of the difference between summative and formative assessment, and the importance of adopting a reflective stance in making evaluations;
- an enhanced ability to use a plurality of assessment instruments (such as world café, concept cartoons, and portfolios) to collect and combine different types of data about environmental education;
- a decreased evaluation anxiety and an increased confidence in the usefulness of evaluation practices built on continuous networking among professionals.

Both teachers and educators think that the evaluation of students is actually a crucial but difficult task. They appreciate the structure of IBSE as it pays special attention to the evaluative process. However, unlike the first training course, in the second they were able to spend more time on clarifying the meaning and purpose of evaluation and putting systematic assessment into practice through the use of concept cartoons, forums, diaries, questionnaires, concept maps, portfolios of evidence, interviews, and observations.

Concept cartoons have been especially appreciated as a creative combination of words and drawings enabling teachers and pupils to explain their perspectives about IBSE activities. As one participant stated during an interview: “I really like concept cartoons. I introduced them in my class as a base for debating environmental subjects”.

The IBSE forum also proved to be a valid support to the development of an evaluation culture, especially because it allows teachers to share opinions, experiences and questions about how to implement assessment effectively.

Similarly, personal diaries helped professionals to actively reflect about their own personal role in the assessment process: “We need to evaluate not only the knowledge that the students acquired, but also the inquiry and social skills developed during the IBSE activities, for example working in small groups. Besides this, evaluation helps me to understand how successful I have been in managing the IBSE activity”.

Questionnaires confirm that crossing both external evaluation and self-evaluation is a very effective way to analyse the practitioners’ needs for continuous training in terms of IBSE pedagogical approach.

Nevertheless, the investigation highlights two main critical points as well.

Firstly, IBSE projects are based on a constructivist view which emphasizes the collaborative role of learners seen as a community. Yet, current practices of evaluation used by IBSE are only partially consistent with this participative model as actually a cognitive model, orientated to a more individual learner perspective, often prevails. This individual perspective is emphasized by the use of observation grids strictly focused on the behaviour of one student at a time, and multiple choice tests addressed to assess the information the students acquired. Teachers generally comply with this

attitude, as it represents a short cut to cope with the pressure of assigning grades and offer quick evidence about learning improvements. As a teacher noted: “I disagree with the current spread of bureaucratic evaluation based on the quantity of information a child is supposed to swallow. Assessing skills takes time”.

Collaborative practices such as collecting data in a group, planning and conducting investigations, interpreting evidence, drawing conclusions and discussing results with peers and adults have to be taken into account, as they are at the centre of the IBSE approach. ECB perspective can help to provide a more balanced style of evaluation, able to further enhance the benefits of the IBSE participative model.

Secondly, though INQUIRE has strived to introduce a positive view of evaluation practices, professionals still find it hard to see evaluation as a supporting process for learning activities. Evaluation procedures are often fragmentary or confined to limited lapses of time, mainly focused on pre- and post-tests more than on the real dynamics of educational intervention itself. Consequently, as the practitioners usually see assessment more as a summative than a formative practice, the learning potential of students is frequently overlooked.

Our research shows that many practitioners are aware that formative evaluation requires careful planning of time and resources. Most of them want to improve their abilities to conduct a meaningful evaluation of scientific educational practices. The evaluation activities developed during the INQUIRE project confirm that ECB could be a reliable framework to integrate time requirements with a high quality assessment.

However, a “suspicious” attitude sometimes resurfaces, proving that building a high level of confidence among professionals towards evaluation is a long road. Fixing the misalignment between cognitive and constructive paradigm, and summative and formative assessment would be an important step in the right direction, as well as supporting the continuous training of professionals on the basis of ECB perspective as a way to provide innovative competences and tools to be implemented in daily evaluation practices.

REFERENCES

Coyle, K. 2005, Environmental Literacy in America: What Ten Years of NEETF/Roper research and related studies say about environmental literacy in the U.S., The National Environmental Education & Training Foundation.

Crohn K., Birnbaum M. 2010, Environmental education evaluation: Time to reflect, time for change, in Evaluation and Program Planning, 33 155-158.

Dillon, J. 2012, Panacea or passing fad, how good is IBSE? BGCI Review, Roots, 9 (2), 4-8.

Duschl, R. A., Grandy, R.E. 2008, Reconsidering the Character and Role of Inquiry Science: Framing the Debates. In R.A. Duschl & R.E. Grandy (Eds.),Teaching Scientific Inquiry, Sense Publisher, Rotterdam, Taipei.

Fleming, L. & Easton, J. 2010, Building environmental educators’ evaluation capacity through distance education. Evaluation and Program Planning, 33, 172-177.

Forbes C. T., Zint M. 2011, Elementary Teachers’ Belief About, Perceived Competencies for, and Reported Use of Scientific Inquiry to Promote Student Learning About and for the Environment, The Journal of environmental education, 42(1), 30-42.

Harlen W. 1999, Assessment in the Inquiry Classroom. In: National Science Foundation (NSF), Foundations 2: Inquiry. Arlington, Va. NSF.

Harlen W. 2005, Teachers’ summative practices and assessment for learning – tensions and synergies, The Curriculum Journal, 16 (2), 207-223.

Linn, M. C, Davis, E. A. and Bell, P. (Eds) 2004, Internet environments for science education, Mahwah,NJ: Lawrence Erlbaum Associates.

Minner, D. D., Levy, A. J., & Century, J. 2010, Inquiry-based science instruction—What is it and does It matter? Results from a research synthesis years 1984 to 2002, Journal of Research in Science Teaching, 47(4), 474-496.

NEEAC (National Environmental Education Advisory Council) 1996, Report assessing environmental education in the United States and the implementation of the National Environmental Education Act of 1990.

Preskill, H. and Boyle, S. 2008, A Multidisciplinary Model of Evaluation Capacity Building. American Journal of Evaluation, 29 (4), 443–459.

Rocard, M., Csermely, P., Jorde, D., Lenzen, D., Walberg-Henriksson, H. and Hemmo, V. 2007, Science Education Now: A Renewed Pedagogy for the Future of Europe, Brussels, Directorate General for Research, Science, Economy and Society.

Stockdill, S. H., Baizerman, M., & Compton, D. W. 2002, Toward a definition of ECB process: A conversation with the ECB literature, New Directions for Evaluation, 93, 7–25.