

Chapter 6

How to Relate Research on Students' Views and Teacher Education About Inquiry With Dissemination Activities

Italo Testa

University Federico II, Italy

Silvia Galano

 <https://orcid.org/0000-0002-3510-8658>

University Federico II, Italy

Alessandro Zappia

Liceo Nitti, Italy

Giuliana Capasso

University Federico II, Italy

Luigi Antonio Smaldone

Caserta Planetarium, Italy

ABSTRACT

Inquiry-based science education (IBSE) has been acknowledged as central in many curriculum reforms since mid-nineties. In this chapter, the authors aim to investigate the way IBSE was implemented by Italian science secondary school teachers in the context of the Chain Reaction Project. Thirty teachers attended a professional development course aimed at familiarizing them with IBSE principles. Then, the teachers implemented in their classrooms a teaching-learning sequence (TLS) for at least 5 hours. About 900 students were involved in the activities. Effectiveness of the TLS was measured by administering a pre- and post-implementation questionnaire about Nature of Science. Findings suggest that TLS inquiry aspects have been only partially adopted by the teachers. Moreover, they found that students that obtained the lowest score in the post-test questionnaire were taught by the teachers that mostly transformed the proposed TLSs. The data suggest the need to develop specific training courses to support teachers in the implementation of new methodologies as IBSE.

DOI: 10.4018/978-1-5225-5439-4.ch006

INTRODUCTION

Inquiry Based Science Education (IBSE) has been acknowledged as central to many curriculum reforms since the mid-nineties. The implementation of inquiry practices and their effectiveness have been increasingly debated since the 2000s also in Italy, due to some recent reforms that try to innovate the teaching practice. However Italian school science curricula are still, in many respects, strongly content-laden and teachers have a limited knowledge of methods and approaches related to IBSE. The aim of this paper is to describe how the activities proposed in the framework of the Chain Reaction project impacted on school practice of the participating teachers. The paper is organized as follows. In the first section, we describe the Italian secondary school context. In the second section we describe how the Chain Reaction project was implemented in the Italian educational context. In the third section, we briefly discuss the main barriers that we encountered in the implementation in classroom practice of the Chain Reaction project. In the fourth section, we present how the Chain Reaction activities impacted on local teaching practice. Finally, we discuss what we have learned from the Chain reaction Project and some future steps we will implement.

1. REFORMS AT SECONDARY SCHOOL LEVEL IN ITALY

The implementation of inquiry practices and their effectiveness for learning are being increasingly debated due to recent reforms that tried to innovate teaching practice in Italy. Such efforts were mainly pushed to the front on the wave of unsatisfactory results of Italian students in international surveys as, e.g., IEA's Trends in International Mathematics and Science Study (TIMSS)¹, and were nested in the organization reported in Table I. Similarly, to previous school curricula developed in Italy since the first decades of the 21st century, the proposed reforms are implemented through specific guidelines issued by the Italian Ministry of Education for each type of school stream.

The guidelines list the expected student learning outcomes for each subject. These outcomes, in the latest version², are organized around three transversal dimensions: *knowledge*, *skills* and *competences*. The *knowledge* dimension refers to the content students should know, for example, "Newton's second law". The *skills* dimension refers to specific abilities related to the content that the students are expected to acquire in a short-term time unit: in particular, they represent the ability to apply knowledge to solve problems, for example, predicting the motion of a body on an inclined plane. The *competence* dimension refers to a larger and more complex area of abilities that students are required to develop throughout their studies. Such abilities are often interdisciplinary to school subjects, since they do not concern a specific discipline, but rather refer to methodological and personal attitudes in different situations. Examples include the ability to support an argument or to understand a written text, as well as the ability to interpret a plot or a table. As such, students are expected to acquire such abilities over many years.

As a consequence, topics (or sequences of topics) to be taught are only broadly indicated in the official policy documents; the extent and breadth, to which a specific content area should be taught (for instance, focusing on related processes and models), is left up to teachers. As an example, we report an excerpt concerning energy:

15 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/how-to-relate-research-on-students-views-and-teacher-education-about-inquiry-with-dissemination-activities/226323

Related Content

Designing and Teaching an Online Elementary Mathematics Methods Course: Promises, Barriers, and Implications

Drew Polly (2015). *STEM Education: Concepts, Methodologies, Tools, and Applications* (pp. 644-665).

www.irma-international.org/chapter/designing-and-teaching-an-online-elementary-mathematics-methods-course/121865

Gender Differences in the Prediction of Mathematics Achievement by Digital Engagement and Attitudinal Factors: A Hierarchical Linear Modeling of TIMSS 2023 Data From 13 EU Countries

Musa Sadakand Aye Sena Kandezolu (2026). *Gender Equity in Mathematics Education* (pp. 187-218).

www.irma-international.org/chapter/gender-differences-in-the-prediction-of-mathematics-achievement-by-digital-engagement-and-attitudinal-factors/391237

Computer Programming in Elementary and Middle School: Connections across Content

Danielle Boyd Harlow, Hilary Dwyer, Alexandria K. Hansen, Charlotte Hill, Ashley Iveland, Anne E.

Leakand Diana M. Franklin (2016). *Improving K-12 STEM Education Outcomes through Technological Integration* (pp. 337-361).

www.irma-international.org/chapter/computer-programming-in-elementary-and-middle-school/141195

Gender Equity in Mathematics Classroom Settings

S. Chandralekha, P. Selvakumar, M. Karthigeyan, Pritam Lanjewar, Aditya Dive, Mohit Sharmaand

Manjunath T. C. (2026). *Gender Equity in Mathematics Education* (pp. 71-98).

www.irma-international.org/chapter/gender-equity-in-mathematics-classroom-settings/391233

Cloud Computing for Teaching and Learning: Design Strategies

Bay Arinze, Cheickna Syllaand Onuora Amobi (2016). *Handbook of Research on Cloud-Based STEM Education for Improved Learning Outcomes* (pp. 159-171).

www.irma-international.org/chapter/cloud-computing-for-teaching-and-learning/144090