Chapter 8
IBSE Training Feedback and Its Impact on the Design of the Next Training Program: Insights for Trainers

Kallia Katsampoxaki-Hodgetts
University of Crete, Greece

Stylianos Terzakis
University of Crete, Greece

Nikolaos Chaniotakis
University of Crete, Greece

ABSTRACT

An inquiry science-based education is commonly followed in a variety of educational contexts around the world and is a key parameter in various national curriculum guidelines. The impetus of this chapter is to record the initial and final reactions of science teachers participating in a series of one-year action research and training program that took place in the University of Crete (UoC) in 2013-2016, identify their perception of the first training course, and explore the impact this data had on the program's redesign for the following training session by the technical board. Teacher reactions and responses regarding what they thought had, and had not, worked well in their classes were taken into account prior to re-designing the training program that the new teachers were going to join the following year. Looking into the general benefits as well as challenges, the authors also examined the overall effect of the UoC IBSE training program to participants as reported by both students and teachers.

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INTRODUCTION

Inquiry Science Based Education (IBSE) is commonly followed in a variety of educational contexts around the world and is a key parameter in various National Curriculum guidelines (Katsampoxaki-Hodgetts et al, 2014, National Research Council, 2012). Despite its conceptual underpinnings being embraced by many teachers and trainers as a means of fostering critical thinking, empowering the students with science related skills and increasing students' preference for science-related careers (Saltiel, 2012) and despite evidence that inquiry can address the needs of diverse students (Atwater, 1994), there are still limited numbers of testimonials that the Chain Reaction IBSE case-based scenarios could provide a ready-made "recipe for success" applicable to almost everyone.

On the one hand, traditional science teaching concepts often make use of compartmentalised input such as data, formulas, equations or theories, that are difficult for students to understand and use appropriately in the right context (Trna, J. et al., 2012). As such misconceptions of scientific concepts and memorisation of theories and practices that are not linked to everyday life take their toll on student motivation and their interest in the studying of science (Osborne and Dillon, 2008). On the other hand, the effect of collaborative inquiry in science education has been well documented in the literature. When students use inquiry-based student-centred approaches that emphasise students' own ideas and questions (Colburn, 2000), they seem to develop team-working skills and skills for critical thinking, problem solving, evaluation and communication which are integrated in their inquiry. Students conduct research similar to scientists and their scientific literacy skills appear to be improving (Gormally et al., 2009) despite pedagogical and conceptual challenges (Bell et al, 2010).

Although there is extensive literature taking into account student feedback in re-formed curricula (Kazempour et al., 2012) and considerable literature indicating the difficulty of assigning new roles to science teachers (Abd-El-Khalick, F., 2004, Crawford, 2000; Crawford, 2007; Capps and Crawford, 2012), there seems to be limited literature regarding the impact of teacher feedback and its role to the implementation of new IBSE training programmes. For example, Trna J. et al .(,2012) provide a comprehensive description of their training programme but they fail to go beyond that; there is little reflection on their training programme and their professional development input and approaches. In the same vein, Anderson (2007) and Abd-El-Khalick et al. 2004 focused on inquiry as content and subject-matter to be learned. A similar approach is followed by Juntunen and Aksela (2013) who describe their framework of in-service training course in terms of how the input was delivered to the students with little reference to the effectiveness of the training impact on teachers' feedback and how these feedback was used for training purposes.

The impetus for our study is to record initial and final reactions of the science teachers participating in a series of one-year action research and in-service training programmes that took place in the University of Crete (UoC) in 2013-2016, identify their perception of the first training course and explore the impact this data had on the teacher training programme re-design by the Technical Board. Bianchini and Colburn's (2000) conceptual framework in which the teacher acts as a researcher, Jeanpierre et al (2005) professional development characteristics with a focus on both content and process, and Vygotsky's (1978) social constructivism in education were instrumental in designing our in-service teacher training programme in which teachers had to convey the nature of science effectively to students.

Teacher reactions and responses regarding what they thought had, and had not, worked well in their classes were taken into account prior to re-designing the training programme for the new teachers that were to join the following year. Looking into the general benefits as well as the challenges, we also exam-