17. INTRODUCTION TO PART IV

Impacts of professional development

INTRODUCTION

Role of this part in the book

Primary science education should be an essential aspect of development of education, like reading, writing and mathematics were in the last two centuries (Lena, 2006, 2009). This view has led to new developments worldwide, based on inquiry pedagogy, for example in large EU programmes in Europe but also in China, Brazil and the United States (Lena, 2006, 2009). The results of these new approaches also led to new teacher training concepts and insights. In this section an introduction of factors with an impact on professional development is presented starting with general findings on professional development and reform movements and followed by a focus on findings of research on science and technology teacher education.

Teachers are central to school improvement efforts. They are the most significant and costly resource in schools. Considering the changes and reform movements in science and technology teaching during the last decades, the pace of change has been such that developing and learning science and technology teaching has become a major issue internationally (Harlen, 2009). The question is how to engage teachers in all new developments in the context of continuing professional development. And which types of professional development activities engaged in are effective especially with respect to science & technology? It is generally known that the way science & technology is taught in schools is not effective enough. It is necessary to focus on building greater capacity and stability (Lena, 2006). Therefore most European countries promote a renewal of science education through ‘inquiry based’ methods and teachers being part of a network (EC, 2007).

FACTORS CONTRIBUTING TO EFFECTIVE PROFESSIONAL DEVELOPMENT

Professional development is defined as those activities that develop teachers’ skills, knowledge, expertise and other characteristics (OECD, 2009). This development can range from formal to informal, in the form of courses, workshops or formal qualification programmes through collaboration in networks across...
schools or within schools, sharing their good practices. Successful programmes are programmes focused on the development of teachers’ learning communities. Developing schools as learning organizations and ways to share expertise and experience systematically seem to be effective too (OECD, 2005).

**Teacher quality**

Fullan (1993) states that quality of professional development is the key for educational improvement. The OECD emphasizes the need for high quality teaching and the ability for all students to have access to high quality of their teaching (OECD 2005; Education Council of the Netherlands, 2008). Teacher quality is related to teaching experience, qualifications, experience and indicators of academic ability or subject-matter knowledge. A large programme focused on the content students were to learn, active learning and follow-up to enhance teacher quality had an impact on content focus, active learning, and follow-up and follow-up on knowledge and professional community (Ingvarson, Meiers & Beavis, 2005). Top performing nations even have a strategy with highly selective training programmes so they recruit top talent in its teaching profession (McKinsey & Company, 2010). Furthermore, research shows convincingly that teaching teaching quality improves learning of students (OECD, 2005; 2009; Dagevos, Gijsberts & Van Praag, 2003; McKinsey & Company, 2007).

**Teachers’ general perceptions on professional development**

Almost all teachers engage in informal dialogue with others to improve their teaching and the vast majority reads professional literature. However, in general about 11% of teachers does not take part in any of the structured forms of professional development for 18 months (OECD, 2009). In general, teachers report a moderate or high impact for the types of professional development they had undertaken. The most effective types of development were *Individual and collaborative research, informal dialogue to improve teaching and qualification programmes*. It is striking that up to 90% of the teachers report a moderate to large impact of these types on their development as a teacher (OECD, 2009). As teachers’ perceptions and views are important factors believed to influence their behaviour this view has to be involved in the context of developing continuing professional development. Furthermore, regarding the activities having the highest impact in the view of teachers, it has been found that paying for activities and their investment in time enlarges the impact of professional development activities (OECD, 2009). They also need extra individual support. Strengthening the system of teacher appraisal and feedback can develop subsequent changes in their teaching within schools, according to teachers reports. Mostly teachers have few incentives to improve their teaching. Professional development, especially in the case of Science and Technology, might be effective when they share stable professional relationships with other teachers, such as networks for teacher development and mentoring (OECD, 2009). Networks can be used as effective components of