

## Chapter 7

# Online Communities of Practice as Vehicles for Teacher Professional Development

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### **ABSTRACT**

*The affordances offered by modern Internet technologies provide new opportunities for the pre-service and in-service training of teachers, making it possible to overcome the restrictions of shrinking resources and geographical locations and to offer high quality learning experiences to geographically dispersed teachers. The focus of this chapter is the question of how information and communication tools made available online could be effectively exploited to build and study network-based services with the aim of fostering online communities that promote teacher learning and development. The chapter presents an overview of the main experiences gained from a study which investigated the forms of collaboration and shared knowledge building undertaken by a multinational group of teachers participating in EarlyStatistics, an online professional development in statistics education targeting European elementary and middle school mathematics teachers. Findings from the study provide insights into the factors that may facilitate or hinder the successful implementation of an online community of teaching practitioners.*

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## INTRODUCTION

In a world where the ability to analyze, interpret and communicate information from data are skills needed for daily life and effective citizenship, statistical concepts are occupying an increasingly important role in mathematics curricula worldwide. Statistics has already been established as a vital part of school mathematics in many countries. The subject, however, has been introduced into mainstream math curricula without adequate attention paid to teachers' professional development. There is some evidence of poor understanding and insufficient preparation to teach statistical concepts among both pre-service and practicing teachers (e.g. Watson, 2001; Chick & Pierce, 2008). Many of the senior teachers have never formally studied the subject. Younger teachers may have taken an introductory statistics course at college, such a course however does not typically adequately prepare future teachers to teach statistics in ways that develop students' intuition about data and uncertainty (Rossman, Medina, & Chance, 2006). College-level statistics courses are often lecture-based, not allowing future teachers to experience the model of data-driven, activity-based, and discovery-oriented statistics they will eventually be expected to adopt in their teaching practices. As a result, some teachers tend to have weak knowledge of the statistical concepts and to focus their instruction on the procedural aspects of statistics, and not on conceptual understanding (Watson, 2001).

The direct relationship between improving the quality of teaching and improving students' learning in mathematics is a common thread emerging from educational research (Stigler & Hiebert 1999). Thus, it is critical for mathematics teachers to have rich teaching and learning experiences in statistics and its pedagogy. Technology advances, and especially web-based training, provide new opportunities for teacher initial and in-service training in statistics education. Internet technologies make it possible to overcome restrictions of

shrinking resources and geographical locations and to offer, in a cost-effective and non-disruptive way, high quality learning experiences to teachers.

Numerous initiatives in online teacher training serving large numbers of educators are underway. Several of these programs exploit the richness of interactions fostered by the Web to build and study network-based services with the aim of fostering online communities of teaching practitioners. Communities of practice is a construct grounded in an anthropological perspective that examines how adults learn through social practices (Gray, 2004). A community of practice consists of a group of individuals with a shared domain of expertise, who engage in a process of collective learning about practices that matter to them (Wenger, 1998). A promise of new web-based technologies is that they can enable geographically dispersed teachers to engage in online communities, in which they can exchange ideas with other teachers and garner support as they try new strategies in their classrooms (Cochran-Smith & Lytle, 1999).

This chapter focuses on the question how the information and communication tools made available by modern internet technologies could be effectively utilized in order to build and study network-based services with the aim of fostering online communities that promote mathematics teachers' learning and development. It first provides an overview of the existing literature on online communities of practice. It then reports on some of the experiences from an exploratory study designed to investigate the forms of collaboration and shared knowledge building undertaken by a multinational group of mathematics teachers participating in online professional development in statistics education. The main insights gained from the study regarding enabling and constraining factors to the successful implementation of an online community of practice are discussed. Based on the analysis of these data, some recommendations for mathematics educators involved in pre-service and/or in-service teacher training who wish to incorporate online communities of

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