Chapter 7
The Role of a WhatsApp Group of a Professional Learning Community of Chemistry Teachers in the Development of Their Knowledge

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ABSTRACT
The authors analyze chemistry teachers’ discourse in a WhatsApp group. This online communication platform is used for continually studying the communication behavior of leading chemistry teachers who are members of a professional learning community (PLC). They describe the network of chemistry teachers’ PLC in Israel, which provides the context for the study. WhatsApp enables sustained ongoing, intensive interaction, and sharing of knowledge that is practical, directly related to the members’ needs, and is participant driven and constructivist in nature. A theoretical perspective of teachers’ knowledge and professional development (PD) was developed in 2015 by Gess-Newsome, which was applied to examine the mechanism underlying teachers’ knowledge development.
INTRODUCTION

The McKinsey report (Barber & Mourshed, 2007), which investigated successful education systems, describes two basic requirements needed in order to develop a high-quality education system: (1) to attract high-quality teachers to the system; and (2) teachers need to continuously develop their professionalism. Teachers are the key for achieving good education, and therefore, effective ways in which they can develop their knowledge and skills are essential to improve education systems.

This chapter discusses the knowledge development of leading chemistry teachers who participate in a Professional Learning Community (PLC) of chemistry teachers; it focuses on the contribution of a WhatsApp group to this development. In Israel, chemistry PLCs were initiated in 2014 and operate at the Weizmann Institute of Science with support from the Ministry of Education and the Trump Foundation. Chemistry teachers meet in the PLC regularly to explore their teaching practice and their students’ learning achievements. The PLC facilitators try to create a feeling of trust (Tschannen-Moran, 2009) among the teachers in the PLC. In practice, however, not all the communities work—many fail. The trust and the created sense of community (McMillan & Chavis, 1986) lead to creating a safe environment in which teachers can share their questions regarding teaching, their difficulties, and also their successes (Booth, 2012). The main emphasis in the PLC is on developing the teachers’ pedagogical content knowledge (PCK) in an environment, which for the PLC members, supports a sense of belonging. These activities focus around the students (Rogers, 1983). Using students’ data is a key component of effective professional development design (Guskey, 2003; Little, 2012) Namely, teaching is discussed less than the influence of a selected pedagogy on students’ learning. These goals are achieved by including the following components in the chemistry teachers’ PLC meetings:

- An opening exercise that deepens the social and personal acquaintance of the chemistry teachers in the PLC.
- Investigation of students’ understanding and misconceptions in chosen chemistry topics using diagnostic tools that were designed for the chemistry teachers’ PLC.
- Discussion of pedagogical ways to deal with the misconceptions that teachers find in their own classes (based on evidence revealed by analyzing the diagnostic tools in class).
- “My corner”: A section in which one of the PLC teachers presents a short activity that the other teachers can easily adapt to their own class. This section can be a lab experiment, a demonstration, or a technological tool that can be integrated into the chemistry lesson.
- **Chemistry Laboratory**: New experiments and their integration into chemistry class.
- **“Teachers’ Questions”**: A section in which the teachers in the PLC raise a problem that they face in their own chemistry class, for which they need help from the PLC.

The chemistry teachers’ PLC operates in a net model (shown in Figure 1). A leading PLC, which includes leading chemistry teachers, meets every other week at the Weizmann Institute of Science. In the other week, the leading chemistry teachers lead in pairs a regional chemistry teachers’ PLC. Eight regional chemistry teachers’ PLCs have operated close to the teachers’ home (CtH), which have spread throughout Israel in the last 4 years. About 200 chemistry teachers, namely, 30% of the chemistry teachers in Israel, are members of these PLCs.
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