

Collaborative learning (CL) refers to situations and environments in which learners engage in common tasks and each individual capitalizes on resources and skills from one another (Bruffee 1993; Dillenbourg 1999; Mitnik et al. 2009). It is based on the model that knowledge can be created within a population where members actively interact by sharing experiences and take on asymmetrical roles (Chiu 2000, 2008). Computer-supported collaborative learning (CSCL) denotes a pedagogical approach characterized by the sharing and construction of knowledge among participants using technology as their primary means of communication or as a common resource. In this approach, learning can either synchronously or asynchronously take place in online and classroom learning environments via social interaction using computers or through the Internet (Stahl et al. 2006). CSCL continues to thrive on the back of the rapid growth in cheap and powerful knowledge access technologies connecting and enabling students to carry out ever more learning, coursework and assessment tasks together (Dillenbourg 1999; Ruta et al. 2013; Hirsch et al. 2013; Dirkx and Smith 2004; Davidson and Sternberg 2003; Barkley et al. 2004), and has been widely considered as a method to improve learning performance (Zheng and Huang 2016).

In collaborative learning, however, the behavior and, thereby, the learning patterns observed are much more complex than that of individual learning. While there is a wide body of qualitative evidence reporting the benefits of collaborative learning, the thorough quantitative analysis is clearly lagging behind in the literature. This is perhaps due to difficulties with