Chapter XI
Evaluating the Learning Effectiveness of Collaborative Problem Solving in Computer-Mediated Settings

Ourania Petropoulou
University of Piraeus, Greece

Georgia Lazakidou
University of Piraeus, Greece

Symeon Retalis
University of Piraeus, Greece

Charalambos Vrasidas
CARDET, Cyprus

ABSTRACT

There is a growing need for systematic evaluations of computer-supported collaborative learning environments. The present chapter focuses on the evaluation of the learning effectiveness of the interactions that take place in computer-supported problem solving environments. This chapter emphasizes the need for supporting evaluators of such environments with holistic evaluation conceptual frameworks and tools that can facilitate the analysis of data gathered during the evaluation process. We discuss in detail such a holistic framework which has been tested through a primary education case-study.
INTRODUCTION

Collaborative problem solving is used widely in all grades of education (Stanic and Kilpatrick, 2003; Jonassen et al., 2003; Schoenfeld, 2006). Tutors try new practices to develop their students’ problem solving skills through collaboration. A number of powerful Computer Supported Collaborative Learning (CSCL) tools (either synchronous or asynchronous) have already been developed and used to foster learner’s skills. They help the development of networked learning communities whose members communicate and interact to build a shared understanding of a domain (Schwartz, 1995). In a networked community problem solving, learners and tutors, share knowledge, experiences and resources for finding the most appropriate problem solving techniques as well as the solution to a given problem.

People promoting computer supported collaborative problem solving environments generally target the acquisition of higher-order thinking skills, problem solving abilities, epistemic fluency and the collaborative improvement of knowledge within a field of practice (Oliver and Herrington, 2003, p.115; Goodyear, 2002, pp.58-63). Evaluation of the learning effectiveness of such environments is not an easy task. This is why very few systematic and complete evaluation studies in authentic educational environments have been reported in the literature (Wallace, 2003). Evaluation is a systematic process which tries to give insight in how the interactions within networked learning communities affect learning (TELL, 2005). There is a need for defining a framework and accompanied methods and tools which can help evaluators collect, analyze and interpret data about the interactions within networked learning communities. The scope of this paper is to present a holistic conceptual framework for evaluating interactions within networked community problem solving which has been tested and validated in primary education.

The rest of this paper is organized as follows. In the next section we make a brief overview of the theoretical foundations for the added value of community problem solving while we refer to school projects using collaborative problem solving. Then we continue with a short overview of current approaches in the evaluation (methods and tools) of interactions within networked community problem solving, summarizing the strengths and weaknesses of each one. We then propose a conceptual framework for holistic analysis of interaction during a networked collaborative problem solving activity. We present a concrete case study illustrating how this framework been applied in primary schools. Finally, we draw some conclusions and outline future lines of research in the area of evaluation of interactions within networked community problem solving.

EXPLOITATION AND THEORETICAL ISSUES OF PROBLEM SOLVING LEARNING COMMUNITIES

Collaborative problem solving has been variably exploited in schools from the first grades and in all disciplines. A great number of projects have been funded in order to explore collaborative problem solving as it is considered as a special style of teaching and learning (Johnston et al., 2000). The first and most cited project is the Jasper Project: an anchored instruction of mathematical problem solving that was developed by the Cognition and Technology Group at Vanderbilt (CTGV, 1997). According to this project solvers explore and model a problem space involving mathematical problems for extended periods of time and from a diversity of perspectives; the problem spaces offer opportunities for cooperative learning and discussion in small groups, as well as for individual and whole-class problem solving. Another well-known project that was developed by the University of Pittsburgh (1998) is the Belvedere