Elementary Students' Perceptions of Social Networks: Development, Experience, and Equity in Collaborative Software Design Activities

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ABSTRACT

More recently, the analysis of social networks in computer-supported collaborative learning environments has received more attention. Less attention has been given to how the participants themselves see collaborative patterns and trends. Towards that end, we interviewed 131 fourth and fifth-grade elementary students at the end of four different ten week-long collaborative software design projects and asked them to describe the type of help they had either given to or received from team members and other students in their class. Technical help with programming problems was by far the most prominent type of help given or received. The frequency of helping interactions not only increased over the course of two design projects but also became more varied. Distribution of helping interactions became only more equitable in a second design project. The discussion addresses methodological issues in using students' perceptions of helping interactions in social network analysis, the nature of students' social resources, the impact of experience, and issues of gender equity in computer-supported collaborative learning.

Keywords

Social network, learning through design, interview analysis, helping interactions, gender differences

INTRODUCTION

Researchers such as Lave and Wenger (1991) see collaborations in apprenticeships as a form of legitimate peripheral participation that allow participants' enculturation into the social practices of a community. Others, such as Moll and Greenberg (1990), focus on social resources within the larger community and talk about the importance of mobilizing 'funds of knowledge' within a classroom for learning. Helping interactions between members have been seen as an instrumental aspects of a community of learners (e.g., Webb & Palincsar, 1996). Many project-based learning environments have made helping interactions an integral feature of their design in the form of getting students to explain and share their understanding (e.g., Blumenfeld, Marx, Soloway, Krajcik, Guzdial, & Palincsar, 1991). The present study builds on research that analyzed helping interaction patterns in students' apprenticeships (Ching 2000) and complements it by focusing on students' perceptions of these helping interactions in their teams and class during a collaborative software design project (Kafai, 1996). It contributes to research on social networks found in computer-supported collaborative learning environments with the goal to examine not only individual contributions but also relationships among peers (Nurmela, Lehtinen, & Palonen, 1999; Palonen & Hakkarainen, 2000).

For that purpose, we asked elementary students in interviews conducted at the end of ten weeklong collaborative software design projects to describe the type of help they had either given to or received from project team members and other students in their class. Students, working in mixed-gender teams, developed their own research questions and implementing instructional software designs as answers. To facilitate helping interactions, student teams were comprised of more or less experienced students. For that purpose we distinguish in accordance with Lave and Wenger (1991) between students as old-timers, i.e., having participated in a previous software design project, and newcomers, i.e., being new to instructional software design activities. This approach resembles models of cognitive apprenticeship (Collins, Brown & Newman, 1989) with the important distinction that not adults but students with previous experience are configured as the more able participants. We used the interviews to develop social network diagrams (Frank, 1998; Wordham, 1999) to visualize participation patterns and relationships between class members. Our analyses included four classes: two parallel classes in the first year (one class had teams with old-timers and newcomers; the other class only newcomers), and two consecutive classes in the second year with teams of old-timers and newcomers—all taught by the same science teacher. In this context, we followed fifteen students from being newcomers in the first year to becoming old-timers in the second year. We examined several aspects: (1) in which ways students described the social resources available in form of other class members, newcomers and old-timers alike, (2) how such social networks develop over time within a classroom community over the course of two consecutive projects, (3) the perspective of students who transitioned from newcomers to old-timers within the project, and (4) the distribution of helping interactions within classes.

Our results indicate that help with programming problems was by far the most prominent type of help given or received. According to students' reports, the frequency of helping interactions not only increased over the course of two design

projects but also became more varied including technical, science and design help. Distribution of helping interactions became only more equitable in the second design project.

In contrast to previous studies, this research was based on spontaneously generated reports of helping interactions by participants rather than observational data or logfile analysis. A comparative observational analysis conducted by Ching (2000) identified different forms of helping interactions around programming issues and confirms that students' perception of helping interactions seem to carry reasonable validity. The positive aspect of the old-timers' presence in teams came in form of help with programming problems. Old-timers also modeled helping interactions for newcomers who are prospective old-timers. The most promising finding appears in the second design project in the same academic year, when not only old-timers but also newcomers were more experienced in project work. Our findings also indicated gender differences in receiving and requesting help. Even in the longitudinal study of old-timer boys and girls we found these gender differences. However, our analysis of programming tests revealed no significant gender differences: old-timer girls are as proficient as old-timer boys in programming are. When we examined the outside helping reports, we found that boys and girls were equally frequent in the position of 'class experts'. It is possible that larger social forces are at play here. For example, it is known that boys tend to play in larger groups than girls do. One could speculate that boys tended to view other boys within their teams and outside of their teams as part of their expanded social network whereas girls tended to limit themselves to within team helping. It is also possible that girls see helping interactions more as 'common practice' and consequently tend to underreport them. Whatever the explanation, it is perplexing to find that gender differences are eradicated in programming proficiency but still replicated in helping structures. While this points to success on some levels, it also indicates that creating equitable learning environments is not just a matter of skill equality.

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