Learner-learner interaction in computer-supported learning environments

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The study analyzes how the learner-learner interaction is implemented in Computer-Supported Learning Environments, enhancing our understanding of how teachers tackle CS-LE to support mathematical problem solving in Italian first degree secondary schools.

In the context of (mathematics) education, researchers and instructional designers have made a plea for the creation of learning environments as a solution to various problems and as a mean to support students learning to further the goals and challenges of education today. The present study investigates how some aspects of Computer-Supported Learning Environments [Hannafin & Land, 1997] are implemented by Italian teachers. The study consists of two parts. First we observe how the students' organization in CS-LEs evolves from preparation to actual enactment in the classes [Borromeo et al, 2013; Stein et al, 2007]. Second, we study the quality and quantity of learner interaction in the implemented CS-LEs. Computer support consists of the use of a Dynamic Geometry Software (Geogebra or Cabri) in curricular mathematics lessons.

In a preparatory interview, the teachers of seven carefully selected case studies (from a sample of 150 teachers in 21 schools) explained how they planned the interaction among the students during the activities. They gave great importance to the learner-learner interaction and stated their willingness to encourage it within each computer-group. We label on-task the students' interaction on the procedure for solving the posed problem. The teachers were very cautious in making the students work in large groups, because they wanted the pupils not to chat among them. We call off-task students chat. The variability was in the number of students constituting the groups where the interaction was allowed: 0. individual work - no interaction (ind-point); 1. individual work - interaction with the close student (ind-pair); 2. computer-group of two students (pair); 3. computer-group of three students (small group). The enacted learner-learner interaction was quite consistent with the prepared one, except for one teacher.

In a previous study [Borromeo, 2015], the analysis suggested that the computer-group constituted by two students was the most favorable one with respect to the combination of a high interaction on-task and a low interaction off-task. In the present study, we analyzed new cases of activities (same teachers-different organization). The Kruskal-Wallis test (which accommodates
the small number of activities), showed a significant positive correlation between the number of students in each computer-group and the quantity of interaction on task (p=.003<.01) and between the number of students and the quantity of chat (p=.013<.05). The quantity of student interaction for each group and for each student within the groups was compared between the different categories of allowed interaction. Each student interacted longer (on-task) when they worked in groups constituted by more than one student as respect to working individually, even if the interaction was allowed with a second student. The biggest increment of interaction was between the categories ind-pair (1) and pair (2). On the contrary, the biggest increment in the quantity of chatting was between the categories pair (2) and small group (3).

Examining the videotapes of the involved activities, both the trends may be explained by the difference in the seating location at the computers. Furthermore we used the Kruskal-Wallis test to investigate the ratio between on-task and off-task interaction. It showed a significant positive correlation with the number of students in each computer-group (p=.021<.05). Analyzing the above distributions, the computer-groups constituted by two students come out to be the most favourable group as respect to the combination between a high interaction on-task and a low interaction off-task (see Fig. 1). Consideration on the analysis may be useful to improve teacher education in order to help to solve hurdles in mathematics education.

References


