ASYNCHRONOUS DISCUSSION AND COLLABORATION TO ENHANCE PROBLEM SOLVING IN MATHEMATICS

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Collaborative learning is pivotal in online education. We discuss how a collaborative digital learning environment with online activities of problem solving (PS) and formative assessment, allows secondary school students to construct and live mathematics as a stimulating challenge, and to develop PS competencies.

MAIN SECTION

The importance of *computer supported collaborative* working has to be instilled in students when they are young. The creation of *communities of practice* allow to take advantage of both the social aspect and the technical possibilities allowed by digital technologies, thus as providing forums in a digital learning environment (DLE). In this framework, a project called *Digital Math Training* (DMT) has been designed and experimented by the University of Turin. It constitutes an original way to develop competences relative to Mathematics, problem solving, and collaborative working. DMT takes place in various phases: in the central one, about 550 students, belonging to different schools, participate to an online training on a DLE, in which they have to solve problems with an Advanced Computing Environment (ACE). They are invited to share knowledge about them, by discussing in forums; their use give them advantages in a scoring system taking into account also the submitted solutions, assessed (Swan et al., 2006) by tutors and self-evaluated.

We analyzed the interventions in forums of 217 students, being in grade 12 during the school year 2018-19, that solved nine contextualized problems in three months by collaborating online (Barana et al., 2017). We classified the interventions in: technical help requests, clarification to the text of the problems, comparison of results, comparison of procedures, construction of procedures, reflection on mathematical concepts. On the other hand, we analyzed some questions to a final questionnaire, dedicated to all the students. Analyzing forums (one for every problem), we found how interactions between students on one side were numerous (total: 331 discussions and 2470 interventions), and on the other side were so profitable to allowing tutors to intervene only rarely. Furthermore, relatively to the first problems, technical help requests and clarifications to the text constituted the majority of interventions, while relatively to the latest problems, more discussions concerning procedures (comparison and construction) or reflections on mathematical concepts arose. This can be interpreted as a sign of students gaining confidence in both using the ACE and correctly interpreting the problems' requirements. On the other side, the questionnaire showed their appreciation of specific aspects of the training, as the following scores (in a Likert scale from 1 to 5, where 1 means low and 5 means high) show: the item "The platform had a positive atmosphere" obtained an average of 3.95 (95% CI 3.86 – 4.04). The item "Forums interventions were useful for solving problems" obtained 3.81 (95% CI 3.70 – 3.92), while the item "This kind of collaboration could help me in the future" obtained 3.48 (95% CI 3.37 – 3.59). In particular, it is noteworthy to observe the importance they attributed to peer collaboration: items like "Forums allowed me to find solutions by collaborating" and "I felt helped" had also scores over 3.

References

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