



Contribution ID: 134

Type: **Poster Presentation**

## Solar system at your fingertips: an interdisciplinary learning path

*Tuesday, 2 October 2018 17:48 (1 minute)*

An active learning path was carried out directly by students in a vocational school by following a cooperative-learning approach. At the beginning of the school, some students showed relationship problems and formed small groups that, in some cases, led to the exclusion of pupils with special educational needs. These problems, coming from a quite diversified socio-cultural context, were linked to a lack of interest and a mnemonic few reflective approach to Science.

The path was designed with the aim of creating a learning environment as much involving as possible and with the purpose of fostering aggregation, i.e. form a more cohesive and collaborative class group in which students could appreciate the advantages of cooperative work, help and mutual support. The laboratory path was organized in a sequence of activities carried out during the first part of the year. To encourage research and planning, various phases were designed: firstly an initial brainstorming to stimulate curiosity and allowing to evaluate the prerequisites and misconceptions; secondly the design and the active construction of models on the Solar System and on Kepler's Laws.

Since reasoning with ratios and proportions is widely regarded as a critical bridge between the numerical, concrete mathematics of arithmetic, useful in day life practice, and the abstraction that follows in algebra and higher mathematics, the science teacher in collaboration with the mathematics teacher, realized a further laboratory on the proportionality in celestial bodies, astronomical distances and scale ratios.

All phases were conceived according to a group work and the continuous sharing of the products realized by using the Google Suite and Google Classroom platforms. Collective discussion allowed the comparison of ideas and a problem solving approach to various difficulties that emerged. A relevant activity was the final exhibition in the school: each group presented their products. This led the subsequent self-evaluation and peer review phase.

A closer analysis of laboratories shows that all requests for achieving a cooperative learning are satisfied (Curseo 1992, Johnson 1999), such as positive interdependence, individual accountability, face-to-face promotive interaction, social skills and group processing.

The designing and the planning of the learning-teaching path (Friend 1999) was discussed with special education teachers in order to favoring the active participation of students with special educational needs in cooperative groups. In these cases, the focus was centered on pupil's learning and mainly at the maturation of attitudes (observational, descriptive and cooperative in the classroom) rather than at the contents. The path has guaranteed training success for everyone, none excluded. The interdisciplinary learning path was an effective realization of an inclusive classroom, where also borderline students were involved and gained a successful learning experience.

Cuseo, J. (1992). Cooperative learning vs small group discussions and group projects: the critical differences, *Cooperative Learning and College Teaching*, 2(3).

Friend, M., & Bursuck, W. D. (1999). *Including students with special needs*. Boston, MA, USA: Allyn & Bacon.

Johnson, D.W., & Johnson, R.T. (1999). Making cooperative learning. *Theory into Practice*, 38(2), 67-73.

**Apply to be considered for a student award (Yes / No)?**

no

**Level for award (Hons, MSc, PhD, N/A)?**

N/A

**Primary author:** Prof. VETTORI, Lorenzo (ISI Sandro Pertini, Lucca, Italy)

**Co-authors:** Prof. SESTIGIANI, Alessandro (ISI Sandro Pertini, Lucca, Italy); Dr MONTALBANO, Vera (Department of Physical Sciences, Earth and Environment, University of Siena)

**Presenter:** Dr MONTALBANO, Vera (Department of Physical Sciences, Earth and Environment, University of Siena)

**Session Classification:** Poster Session

**Track Classification:** Track I - Physics and Interdisciplinary Issues