



## Teaching Astronomy from Elementary School to University

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Earth sciences are included in both elementary and secondary education school curricula in Portugal because it increases students' skills concerning living in planet Earth. Astronomy concepts and laws are learned to provide a global understanding of the constitution and characterization of the universe, the solar system and the position of Earth in these systems. The Earth in Space theme comprises: the universe (scale measurements and characterization); the solar system (origin, constitution, orientation, dimension and characterization); the Earth in the solar system (movements and forces); and the Earth (shape and constitution). Interaction processes between the Sun, the Earth and the Moon, (e.g. earth position, explanation of day and night, reason for the seasons, phases of the moon) are also studied. It is aimed that the students learn to monitor and to register the observations.

In this sense, besides the use of planetarium and field observations using telescopes we also propose the use of internet and simulation software. Our experience reveals that software dynamics studies and online exploitation techniques improve student outcomes since they provide the opportunity for students to develop their own mental models. All these resources collectively seem to provide an appropriate creative environment for students. For these reasons, we are working with elementary and secondary school teachers. We firmly believe that it is more likely to result in a gradual progress in their practices, in the curricula and in long-term improvements in students' outcomes.