

Exploring the physics of senses

Vera Montalbano

Department of Physical Sciences, Earth and Environment, University of Siena

Our knowledge of nature relies on sense experiences and perceptions enter in our modelling of reality. The everyday thinking of reality is often far away from the description that emerges from the scientific knowledge taught in school. To explore the physics of senses can be an effective way of improving the students' motivation and connect science to the real world that they experience. The discovery of the mechanisms that allow perceiving reality can make science interesting and useful because it satisfies questions that are deeply rooted. Many topics are involved in the physics of each sense, both to characterize the physical quantities that the sense perceives both to understand the physiological mechanisms that allow the perception. It is not unusual that advanced topics, such as resonance, can be introduced in this context in a very natural and easy way. To achieve a deeper student involvement, specific learning paths have been developed and tested. These paths are usually interdisciplinary and rely on many lab activities to favor active learning in students. Examples of the motivational strategy for some senses are given (sight, hearing, and touch). Preliminary tests with various groups of students (full classes, small groups in optional laboratory and a summer school) are presented. The main results indicate the effectiveness of these learning paths. Some difficulties emerge in expanding them at school whereas there is little habit of teachers to work closely together in interdisciplinary projects. Curricula in secondary school allow selecting topics by teachers and specific projects which enhance motivation are encouraged. How to promote and realize this motivational strategy in this context is discussed.

Keywords: Physics Teaching and Learning, Motivational strategies, Interdisciplinary learning paths