

5 - Teaching-Learning Sequences as Innovations for Science Teaching and Learning | Empirical

SP - (16212) - INTRODUCING THE CONCEPT OF ENERGY THROUGH HEAT AND TEMPERATURE BY MEANS OF INFRARED CAMERAS

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Short Abstract

Research literature has widely addressed the problem of how the concept of energy should be introduced and treated at the school level and the debate is still open. Importance of addressing it already at the primary school level has also been recognized. On another side, the historical development of the concept of energy can be brought back to the early studies on heat by Mayer and Joule, suggesting that a unified treatment of heat, temperature and energy can be a possible route for teaching and learning these complex subjects altogether. As a matter of fact, the concepts of heat and temperature have also been deeply investigated from the point of view of Physics Education. To this respect, the use of infrared cameras has recently acquired increasing interest. In this context, we projected and experimented a learning path centered on the concepts of heat and temperature and on their relation with the concept of energy. The formative module was proposed to a class of prospective primary school teachers (PPTs) of the combined bachelor and master degree in Primary School Education of an Italian University and integrates content reconstruction and active learning strategies inside an experiential and situated modality. The intervention redesigns a previously developed approach - focused on the concepts of heat and temperature and on the use of online sensors - extending it so as to highlight the concept of energy by including the use of thermal cameras. We investigated through pre- and post-assessment questions, worksheets and final interviews how much the proposed path, activities and methodologies can help PPTs in learning and teaching the concepts of heat, temperature and energy. This study suggests that the comprehension of heat in terms of energy transfer and its distinction from temperature as internal energy are more easily grasped using infrared cameras.