

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

SP - (16020) - USING MOTION SENSORS AND OTHER RESOURCES TO IMPROVE LEARNING OF MOTION CONCEPTS

María Orero (Spain)¹; Anna R. Esteve (Spain)²; Jordi Solbes (Spain)²

1 - IES Gonzalo Anaya; 2 - Department of Experimental and Social Sciences Education. University of Valencia

Short Abstract

Students show well-known difficulties in the use and interpretation of kinematics graphs (i.e., position, velocity and acceleration versus time). In this work, a teaching proposal based on the use of motion sensors to obtain real time graphs of the students' motions, graph analysis through an interactive computer simulation and a card game about motions and graphs description has been designed and evaluated with a pre-post questionnaire in order to check if the students' skills on the elaboration and interpretation of kinematics graphs improves. This questionnaire contained 11 selected questions from the 4.0 version of the Test of Understanding Graphs in Kinematics (TUG-K) and was filled in by 117 students (pre-post group) and 210 students (control group) enrolled in the "Physics and Chemistry" course of the 4th year of the Spanish compulsory high school (ages 15 to 16). The statistical analysis of the answers given by the students in the pre-test and post-test (non-parametric McNemar test for paired samples that don't follow a normal distribution) shows a significant difference, with medium size effect, for every item in the questionnaire. Besides, the statistical analysis of the answers given by the students in the post-test and control group (Chi-squared test for non-paired samples that don't follow a normal distribution) shows a significant difference, with medium size effect, for most of the items in the questionnaire. Therefore, the teaching proposal helps to significantly improve the kinematic graphs interpretation skills of the students, a basic skill needed to have a complete comprehension of the concepts of this Physics area.