



## **Interactive Physics: the role of interactive learning objects in teaching Physics in Engineering**

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In this work we present the results of a Project in educational innovation entitled “Interactive Physics”. We have developed resources for teaching Physics for students of Engineering, with an emphasis in conceptual reinforcement and addressing the shortcomings of students entering the University.

The resources developed include hypertext, graphics, equations, quizzes and more elaborated problems that cover the customary syllabus in first-year Physics: kinematics and dynamics, Newton laws, electricity and magnetism, elementary circuits... The role of vector quantities is stressed and we also provide help for the most usual mathematical tools (calculus and trigonometric formulas). The structure and level of detail of the resources are fitted to the conceptual difficulties that most of the students find.

Some of the most advanced resources we have developed are interactive simulations. These are real simulations of key physical situations, not only animations. They serve as learning objects, in the well known sense of small reusable digital objects that are self-contained and tagged with metadata. In this sense, we use them to link concepts and content through interaction with active engagement of the student.

The development of an interactive simulation involves several steps. First, we identify common pitfalls in the conceptual framework of the students and the points in which they stumble frequently. Then we think of a way to make clear the physical concepts using a simulation. After that, we program the simulation (using Flash or Java) and finally the simulation is tested with the students, and we reelaborate some parts of it in terms of usability.

In our communication, we discuss the usefulness of these interactive simulations in teaching Physics for engineers, and their integration in a more comprehensive b-learning system.