Abstract

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Most physics courses in high school start with mechanics, although mechanics concepts are usually more abstract and harder to understand than other concepts in physics. The concept of force is unusually hard for students as its explanations and connections seem to contradict every-day experiences of students, while energy is even more complicated as it is a physical quantity seen only by its effects. In this thesis, a plan for teaching mechanics is proposed to help students build their understanding of the concepts of force and energy. The proposed plan uses a historical approach to introduce the concepts, meaning it is made based on their historical development. The thesis starts by analyzing the theoretical background and the research method to be used in the thesis, and based on this theoretical background, the goals of the thesis are proposed, and two hypotheses are presented to be tested. The thesis continues with a historical analysis of the chosen concepts and a comparison between the history of the concepts and student understanding. Based on the comparison and the parallels drawn between history and student thought processes, a teaching plan is proposed, containing a number of activities and experiments aimed at discovering the chosen concepts in a similar way as they were discovered and understood in history. The thesis ends by presenting the results of testing the proposed plan throughout two schoolyears between 2018-2020. The test produces encouraging results showing the proposed plan and its main ideas are potentially effective in building students' understanding of the concepts of force and energy.

Key concepts: Historical Approach, Didactic Transposition, P-prims, Preconceptions, Force, Momentum, Energy, Three-dimensional Learning.