

USING CROCODILE PHYSICS SOFTWARE TO DESIGN VIRTUAL EXPERIMENTS IN PHYSICS TEACHING AT SCHOOLS (VIETNAM)

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Summary. Physics is an experiment science, therefore, to uphold teaching quality of physics at schools, the quality of using experiments, first, need to be improved. However, with a limited time, such experiments have not always been carried and not always be as successful as expected. Hence, application of information technology and communication in teaching is of significance. In this article we introduce using crocodile physics software to design virtual experiments in physics teaching at schools.

Keywords: physics; crocodile physics; schools; principle; step.

1. Principles to establish virtual experiments in physics education

Principle 1: *The experiment shall express the pedagogical scenarios of teachers.* The lecture contents should be combined with experiment contents to turn information into knowledge. No matter valued an experiment is, it is only suitable and helps to turn information into knowledge by virtue of pedagogical scenario.

Principle 2: *Focusing on main phenomenon of the experiment.* To obtain as much as figures, almost experiments contain links and complicated parts. Thus, teachers need clarify purposes of each experiment, the core of such experiment and instruct students to observe on the track of experiment's purposes.

Principle 3: *Generating opportunities for students to interact with experiments.* It is undeniable that experiments sometimes go beyond the control of teachers, which results in passive acquiring of students and that a chance for interaction between students and teachers, between students and experiment just passes by. Therefore, teacher or virtual experiment designer should seek solutions to overcome that fact. Here are some recommendations:

- Designing experiments and pedagogical scenario in a manner in which both teachers and students can engage in building experiment model and rules.
- Teachers can encourage students to participate in experiments by raising questions or discussing about physics phenomenon and suggesting solutions to make the experiments much more accurate.

Principle 4: *The concord between virtuality and reality.* Virtual experiment is illusive other than real, it turns a natural phenomenon into an experiment under discretion of human before establishing it on the computer. Thus, this virtual world definitely comprise a lot of unreal, uncompleted things to finish its role of replacing phenomena occurred in real world. So as to avoid adverse impacts, the experiment designer should create a real enough environment by setting up next to real virtual experiments which contain complex interactions or reduce as much effects, spurious interactions, far too ideal effects as possible.

2. Procedure to design a physics experiment using crocodile physics

Crocodile physics is used to design virtual experiments of physics subject at schools. This kind of software can be considered as a virtual laboratory with full virtual components. Users can easily operate such equipment since its symbols and appearance are relatively similar to real experiments and users can select and assemble experiments under their choice. Results obtained from experiments on crocodile physics match with real experiments. Hence, crocodile physics can support physics education at schools. To take the advantages of crocodile physics, we recommend procedure to design experiments using crocodile software as follows:

- Building virtual experiment plan: Define purposes, requirements of the experiment, necessary equipment, time and form of using.
- There are 5 steps to design an experiment:
 - + Step 1: Start up crocodile physics, create working space for the experiment.
 - + Step 2: Bring necessary equipment from warehouse to working space.
 - + Step 3: Arrange, assemble equipment under experiment diagram

- + Step 4: Establish necessary features of each object
- + Step 5: Check the diagram, demonstrate the experiment and adjust features of objects. Then, conduct experiment, observe, measure and dispose figures.

Reasonably using teaching software as a mean of supporting shall bring high efficiency since the lecture is much more vivid. With aforementioned procedure, teachers can use crocodile physics to design experiments for purposes of lecture in order to boost professional skills in teaching.

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