

How to get first-year university students show an interest in electromagnetic induction?

Jenaro Guisasola and Kristina Zuza.

Departement of Applied Phycsis. University of the Basque Country UPV-EHU (Spain)

Introduction

Students found physics as a complicated subject, full of equations that frequently do not interest them. This perception is further enhanced with the electromagnetism, in principle, more abstract and difficult to relate to daily life or to technological applications.

The work presenting would like to improve the attitudes of the students to physics in general and especially on electromagnetic induction. "Attitude" word would mean not only interest, also relevance of the physics learnt in relation with the everyday life and connection between concepts and equations. Epistemology may also have an impact on students' perceptions of the objectives of the physics course, and on how to learn physics in general.

Teaching Sequence

A.1 In the afternoons, after spending some time doing university assignments, you meet your friends at a local recording studio. You have started a band and you are rehearsing to record your first disc.

- Make a list of all the items in the studio.
- How many of the objects on your list need electricity to work?
- Do you know on what principles these electrical devices work? Do a search for information on this question and decide which of the devices on the list are powered, entirely or partially, by electromagnetic induction.

A.28 Take the list you made at the beginning of this topic where you wrote down what electrical devices there were in the studio. No doubt there is an electric guitar or bass guitar among them, a microphone, speakers, perhaps an electric cooker or a generator in case there is a power cut or a transformer if the premises is very old and the current is 125V.

Look again at the list of devices that work entirely or partially thanks to electromagnetic induction. Explain how these devices work using the electromagnetic induction model we have studied during this unit.

Implementation of Teaching Sequence

Innovative proposals take as their starting point research in PER and are designed with a constructivist focus.

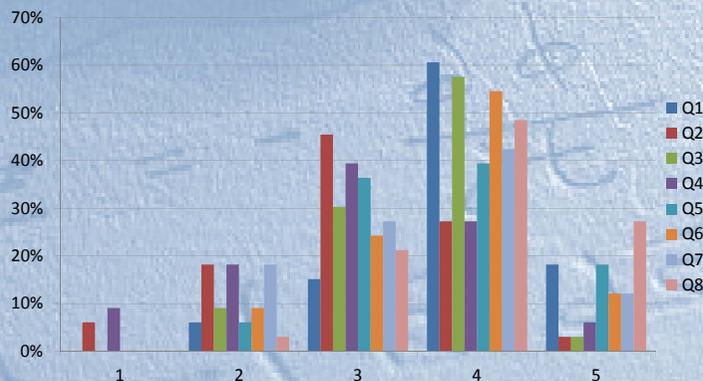
An activity sequence which does not take account of the students' interest in the task to be carried out (attitude) and how to carry it out (epistemology) may prove to be inadequate for effective learning of a law or concept in physics.

In our proposal the students work in groups of 3 or 4 and are guided by activities to resolve the scenarios presented to them. Previous studies have shown the effectiveness of this form of teaching at the University of the Basque Country.

The teaching sequence has been implemented at the University of the Basque Country with students in first year Industrial Engineering in the module Physical Fundamentals of Engineering which includes mechanics and electromagnetism.

Questions

- Electromagnetic induction seems like a topic that should arouse the interest of an industrial engineer as part of his/her work.
- Electromagnetic induction seems like a topic that should arouse the interest of any person as it plays an important role in today's society.
- The problem-solving strategies we have used in class seem to me to be an interesting strategy for the work that an engineer does.
- The problem-solving activities we have used in class seem to me to be an interesting strategy and a useful tool for solving problems in everyday life.
- The objectives we have worked on in this unit on electromagnetic induction have been interesting.
- The activities covered in class have been interesting.
- The way we have worked on electromagnetic induction in class has aroused my interest in this topic.
- This topic has helped me to understand better how everyday objects work.



Results

- The results are not universal they provide compelling evidence that students can experience significant positive attitudinal changes.
- These activities focus not only on the interest aspects of the topic, but also and implicitly, on matters of epistemology and the nature of science itself.
- These results support the inclusion of activities focussing on the interest value of tasks and epistemological aspects in teaching sequences.
- We hope to obtain more results in further research with larger numbers of students and other topics in the field of Physics.