ROBOSTEM Project

Agreement no: 2019-1-RO01-KA202-063965

Erasmus+

Physics Lesson Plan

Topic/Subject: Simple Harmonic Oscillator

Target Group: 10th Grade

Objectives:

Obj1. The modernization of the teaching of Physics in the High school.
Obj2. The increase of the didactic efficiency in the teaching of Physics.
Obj3. The cultivation of the students' interest in Physics.
Obj4. Understand the basic principles of an Harmonic Oscillator, study the kinematics and dynamics of the system.
Obj5. Predict the values of the physical quantities as well as their variation through time, using a theoretical (mathematical) approach.
Obj6. Graphically show the relationship between the displacement of the object with respect to time, and extract values for quantities such as period, frequency, and Amplitude.

Approach/Methodology used: The students attach different objects to a vertical spring and set it to oscillate by extending it just above the proximity sensor. The sensor transfers the data to the Arduino which depicts them in the computer, by constructing a real time graph.

Means/Tools/Educational technology

Objects with variant masses
Extension spring
Windows based computer with office installed (Excel)
Arduino UNO
Breadboard
Cables
Supersonic Sensor

Plan for work

Time	Activities	Methods/ means
10 min.	Theoretical approach of the problem.	Projector, Blackboard
5 min.	Assembly the experimental setup.	Spring, Weight, Stand, Arduino,

		Supersonic Sensor
10 min.	Depict the position as a function of time and compare it with a sine function.	Excel
5 min.	Calculate frequency, period and angular frequency using experimental data.	Analysis Software
10 min.	Compare the experimental data with the theoretical values.	Blackboard
5 min.	Explain differences and discuss with the pupils.	Classroom Discussion

Assessment/Feedback:

There was personal development and acquisition of new knowledge by the teachers and students who participated in the program. Pupils renewed their interest in Physics, mainly through the laboratory exercises, and secondarily from the synthetic works. Through the practical training of laboratory STEM techniques, students gained self-confidence increasing the cooperation between them and strengthening their ability to teamwork, improving communication between the teacher and learners.

Bibliography:

Hugh D. Young , Roger A. Freedman. University Physics with Modern Physics with Mastering Physics: