Working document

OVERVIEW OF THE TASK

Find the solution!

Target audience:	2nd cycle of secondary school (3rd year) AST
Team or individual work:	2 people
Class time required:	6 - 75 minute periods (7 periods including biotechnology)

Pedagogical Aim:

This learning and evaluation situation allows the student to understand the concepts related to the properties of solutions as well as to electrical engineering. First, an experimental process will lead the student to prepare an antiseptic solution with a given concentration. Next, a design process will allow the student to perfect a non-contact solution dispenser, controlled by an electric circuit. The following techniques are broached: preparing a solution, using an instrument of measurement, diagramming, assembly and disassembly.

NOTE: This LES was designed within the framework of training. It will require adaptation before being used with students.

Targeted disciplinary competencies:

C_d-1 Seeks answers or solutions to scientific or technological problems

- Experimental and design processes

C_d-3 Communicates in the languages used in science and technology

- Synthesis, reinvestment and principles diagrams

Targeted disciplinary competencies:

C_t-2 Solves problems

In the course of this LES, through learning activities and complex tasks, the student will have to resolve numerous problems.

Broad Area of Learning	**Health and Well-Being** *Axis of development:* *Knowledge of the consequences of his personal choices on his health and well-being.* Here, knowledge of the elementary principals of hygiene and health are targeted. It is simply a case of becoming aware that bad habits may lead to the ingestion of pathogenic micro organisms. Washing your hands before eating, using antiseptic solutions and coughing into your elbow are examples of proper behaviours to encourage.

Involved world(s)	**Material World:** Organisation of matter • Homogeneous and heterogeneous mixtures (solutions) Transformation of matter • Physical transformation (dissolution) • Particulate model (saturated solution) Properties of matter • Properties of solutions (solute, solvent, solution, concentration, preparation of a solution) **Technological World:** Biotechnology • Pasteurisation (vs. the antiseptic power of alcohol) • Cellular culture (detection of bacteria) Materials • Types of materials and their properties (non-ferrous alloys: nitinol) • Mechanical properties (Characteristics of the structure of nitinol) • Constraints (traction) Mechanical engineering • Typical functions (linkage, guidance) • Typical links of mechanical parts (direct or indirect, rigid or elastic, removable or non removable, complete or incomplete) Language of lines • Form of representation (sketch) • Standards and representations Electrical engineering (control of the soap dispenser) • Supply function • Conduction and insulation function • Control function (push-button switch)
Community resources	Epidemics that occasionally hit our societies are good cultural references. The AH1N1 flu pandemic of 2009 no doubt struck our students. During this pandemic, antiseptic solution dispensers were never so omnipresent in our surroundings. This LES could be the perfect occasion to make a point as to the efficacy of such solutions.
Evaluation: To be determined	
Global context: The entire LES revolves around perfecting an antiseptic solution dispenser. • Perfecting an antiseptic solution and validating its concentration. • Designing a mechanical dispenser controlled by an electrical circuit using various materials.	