

PROJECT EL-STEM LESSON PLAN

Interdisciplinary Approach: Who wants to be the next MasterChef?

Lesson Plan	
STEM disciplines: Science / Mathematics / Computer Science	Duration: 80 minutes
Topics: <ul style="list-style-type: none"> Heat transfer by conduction (thermal conductors and insulators) – Physics. Proportions and percentages (Mathematics) Computational thinking - Algorithms (Computer Science) 	Teachers: Myria Theodoridou Andri Pontiki Christina Vasou-Ilona Lasica
Age: 14-15	Language: English (original: Greek)
Prior Knowledge and Skills Needed	
<p>Students must be familiar with molecular structure of solid materials and to understand the meaning of heat (physics).</p> <p>Students should be able to distinguish between two proportions, be aware of the proportions properties, the percentage usage and the equivalence of units of measurement (Mathematics).</p> <p>Students should be able to study the description of a simple problem and describe accurately the steps of resolving it by using simple sentences – pseudocode (Computer Science).</p>	
Educational Objectives	
<p><i>Knowledge - Comprehension:</i></p> <p>Physics</p> <ul style="list-style-type: none"> Students to be able to design proper experimental activities in order to obtain scientifically correct results. Students to realize that physics have been implemented in every-day practice. Students to find out experimentally that in some solid materials heat transfer through them faster than other materials. Students to see the molecules inside the metal so they can understand how the energy transfer through the metal with the use of augmented reality (HP Reveal) <p>Mathematics</p> <ul style="list-style-type: none"> Be able to solve problems with a proportionate amount. Be able to interpret and use information of varying sizes on problems that are presented verbally, numerically or symbolically. <p>Computer Science</p> <ul style="list-style-type: none"> Understand what an algorithm is Be able to refer to simple algorithms in their everyday life Be able to evaluate algorithms concerning specific problems and enrich them so that they are characterized with clarity, determination, efficiency and permeability. 	

Application –Analysis –Synthesis

- Be able to describe examples of every-day life which are relating with heat transfer on solid materials (physics)
- Be able to apply the proportional amounts in solving problems of everyday life (Mathematics).
- Be able to recognize algorithms as a systemic process to identify and formulate the solution of a problem in their everyday life (Computer Science).

Evaluation

- To get the skill to design appropriate experimental activities in order to end-up to a scientifically correct conclusion (Physics).
- Obtain the skills to exploit the data of the problem, to select the appropriate strategy for its solution and to conclude in a judicious assessment of the reasonableness of their answer (Mathematics).
- Obtain the skills to evaluate algorithms and discern those that meet the specific characteristics of an algorithm (Computer Science).

Teacher's approach to help students achieve the learning objectives and meet their needs

- Learning through a subject of everyday life.
- Learning through exploration.
- Collaborative learning (group activities and group discussions)

Tasks provided for students to develop new knowledge and skills based on the selected pedagogical approaches

Physics

- **Activity 1:** Students are asked to design an experimental procedure for the selection of the optimum pot's material in order to cook faster (So, to find out which material is heated up faster).
- **Activity 2:** Students are requested to observe the heat transfer in material through the molecules, with the use of HP Reveal application.
- **Activity 3:** Students have to select the most applicable ladle in order to cook with safety (Which material is preventing the heat transfer).

Mathematics

- **Activity 1:** Students of each group are asked to modify the quantities of their recipe's ingredients in order to correspond to the quantity of people requested (130 persons) by applying proportionate considerations and using the suggested ml and gr correspondences given
- **Activity 2:** Students of each group are asked to calculate the cost of the recipe they have modified for 130 people using the product price list given to them. Then according to the results the most economically advantageous recipe will be chosen and used for the preparation of the muffins in the charitable bazaar.
- **Activity 3:** At home students are asked to find on the internet or in cookbooks their favourite recipe for any cake or food and calculate the ingredients they will need to make their recipe for the whole class.

Computer Science

- **Activity 1:** Students choose one of the above-mentioned recipes and write the steps of an algorithm (using pseudocode), to guide a robot, so that it can successfully complete the recipe. E.g.

1. Take a bowl of medium size
 2. Put some sugar within the bowl
- **Activity 2:** Students exchange their algorithms and are asked to re-define them as necessary, so that they are characterized with clarity/ determination, efficiency and permeability (specific characteristics of an algorithm).

For example, the above-mentioned algorithm could be re-defined as follows:

1. **Go to the kitchen**
2. **Open the third cupboard**
3. **Find a bowl of medium size and put it on your table**
4. **Close the cupboard**
5. **Put 300 gr sugar in the bowl**

Assessment(s) before, during, and after the lesson

Physics

- If the students are able to design an experiment and select the material that heated faster.
- If the students choose the proper ladle to cook.
- If the student can respond to their homework.

Mathematics

- If the students are able, with analogical reasoning, to find the appropriate dosage of materials to satisfy the proposed number of muffins.
- If the students are able to reach at the most economically advantageous recipe to be used to make muffins for the charity bazaar.
- If the students can respond to their homework.

Computer Science

- If the students are able to write an algorithm to successfully prepare muffins.
- If the students can improve the algorithm so that it has the specific characteristics of an algorithm (clarity/ determination, efficiency and permeability).
- If the students can respond to their homework.

Educational material / equipment/ services/ facilities

For the successful completion of the lesson is essential:

Physics

- Aluminium pot, bronze pot, iron pot
- Lichnos
- Plastic scoop, metal scoop, wooden scoop
- Worksheets
- Smartphone

Mathematics

- Worksheets / Calculator

Computer Science

- Worksheets

Information/ Comments

At the end of this lesson the students have to create, with the use of HP Reveal their own auras to present the recipes or other ideas.

This subject could be exploited by other specialties such as chemistry, design and technology, domestic economy etc.