Report of educational activity

Title of activity	Ship Design
School and level	Secondary education, junior high school
Date	April - May 2019
Country	Greece
Teaching subject	Sciences/Physics, Technology, Engineering
Number and age-range of students	15-20 pupils, age 12-14
Working language	Greek
Type of activity	In-school classroom activity
Level of difficulty	Low to medium
Learning objectives	The theoretical knowledge of buoyancy was one on the main learning goals of the activity. To achieve this through this activity the attitudes and competences of pupils were also engaged, in particular collaboration, experimentation, creative thinking, coping with failure. They also practice design-thinking and engineering process of design-test-improve
General description of activity	Pupils were formed in teams of about 3 persons each. They all were very enthusiastic and creative. They were challenged to design and build with simple materials in limited time a water-tight, strong and stable vessel/ship.

	Then teams presented their design and thinking to other teams and all tested them in a water tank
Learning outcomes	Content knowledge • Understand and acquire content knowledge of subjects like buoyancy, weight, forces, mass, volume, density • Understanding properties, strengths and weaknesses of different materials • Experiment, identify and understand different materials • Balancing the role of structural strength, overall weight and buoyancy • Understanding process of optimal design • Balancing/optimizing between having a structure with extra strength or a lighter one with less weight and less material to use Skills and competences • To be able to model • Abstraction of an idea to a 3-dimensional prototype object or model • Working in group • Working under constraints (time pressure, limited materials, compete with others) • Trial and error / Deal with failure • Competing with others
Materials or equipment that are required	• Water-tank and bottles of water • aluminum foil, baking paper, skewers or drinking straws
Photos or other relevant material	

Interview with teachers

Questions about the classroom application

First: collecting metadata about the event

- What workshop was your application based on?
  Ship Design
- Number of pupils and their level?
  Groups of 15-20 pupils ages 12-14
- Where did you execute the workshop and what was the timing?
  2 activities, period April to May, about 2-3 hours in total

How did it go?

- What went well, what was difficult?

  Pupils were formed in teams of about 3 persons each. They all were very enthusiastic and creative. Due to limited time teams presented their design and thinking very quickly

Did you make changes to the material used in the workshop?

- Were there any challenges in making certain material available?

  No there were no changes to the material

If you look back to the goals of your workshops/lesson, what was the most important part? The knowledge, the attitudes or the competences?

The theoretical knowledge of buoyancy was one on the main learning goals of the activity. To achieve this through this activity the attitudes and competences of pupils were also engaged, in particular collaboration, experimentation, creative thinking, coping with failure etc.

Questions about student/pupil skills

What is your expectation of the students after the class

According to you: What were the learning goals?

What are you hoping that they for sure will remember from the session? (see skill list on bottom)

How have you tried to achieve this?

Specific STEM-skills (subject-related)

- ❑ Example: Working with a laser cutter
- ❑ Example: Understanding of fluid dynamics

- ✓ Understanding of buoyancy
- ✓ Understanding of forces and Newton's Laws
- ✓ Working with simple every-day materials to make models and representations

Transversal skills

- ✓ Willingness to learn
- ✓ Problem solving skills
- ✓ Creativity
- ✓ Ability to communicate on different levels
- ✓ Being pro-active
- ❑ Sense of entrepreneurship
- ✓ Being able to work in group
- ✓ Flexibility
- ❑ ……(Other)

Which level (STEM-ladder) would you say your students have? And how have you tried to improve their level.

Most likely mid-level. Improvement can be by gradual introduction of projects, tasks or activities with more challenges, more complexity

Questions about teacher's own skills

What was the biggest challenge /difficulty when you look back at the class you gave?

- Describe two situations where you were confronted with a problem. What was your reaction to this problem?

Availability of space. Availability of time. Flexibility in the school curriculum

If you were allowed to choose a seminar to further develop your professional competences for these kind of applications, which course would you choose?
e.g. technically oriented (how to use equipment, tools etc)
or theoretically oriented (pedagogical methodologies)
or assessment focused (how to assess progress and skills acquired by students)

Most likely an assessment focused

Questions about the past workshop

Which two talents or skills do you pre-possess that were useful in these workshops?

Modeling/making or work with simple materials, problem-solving
If you were allowed to choose a teaching assistant for this workshop, what qualities would he or she ideally have? Ability to communicate well with school pupils and young persons, organizational skills, ability to work under time pressure and constraints
According to you, what things should students definitely acquire from this workshop? Describe also, how did you try to reach this goal? Work in teams/collaboration, problem-solving, creativity, modeling/making representations
Optional: In which way differs teaching in a Fablab from teaching in a traditional classroom? If possible, mention one or two main advantages and disadvantages in each case. Main advantage is availability of new technologies and equipment. Main disadvantage is that only few exist and they are not close to schools, difficult to prepare a visit with pupils.
Overall, if you could change, add or improve one thing in the workshop you attended what would it be? Overall very satisfied. Looking forward to having more opportunities and similar projects.