Pythagoras

2021-1-RO01-KA220-HED-000032258

Workpackage 1

Toolbox for teachers on Education for Sustainable Development

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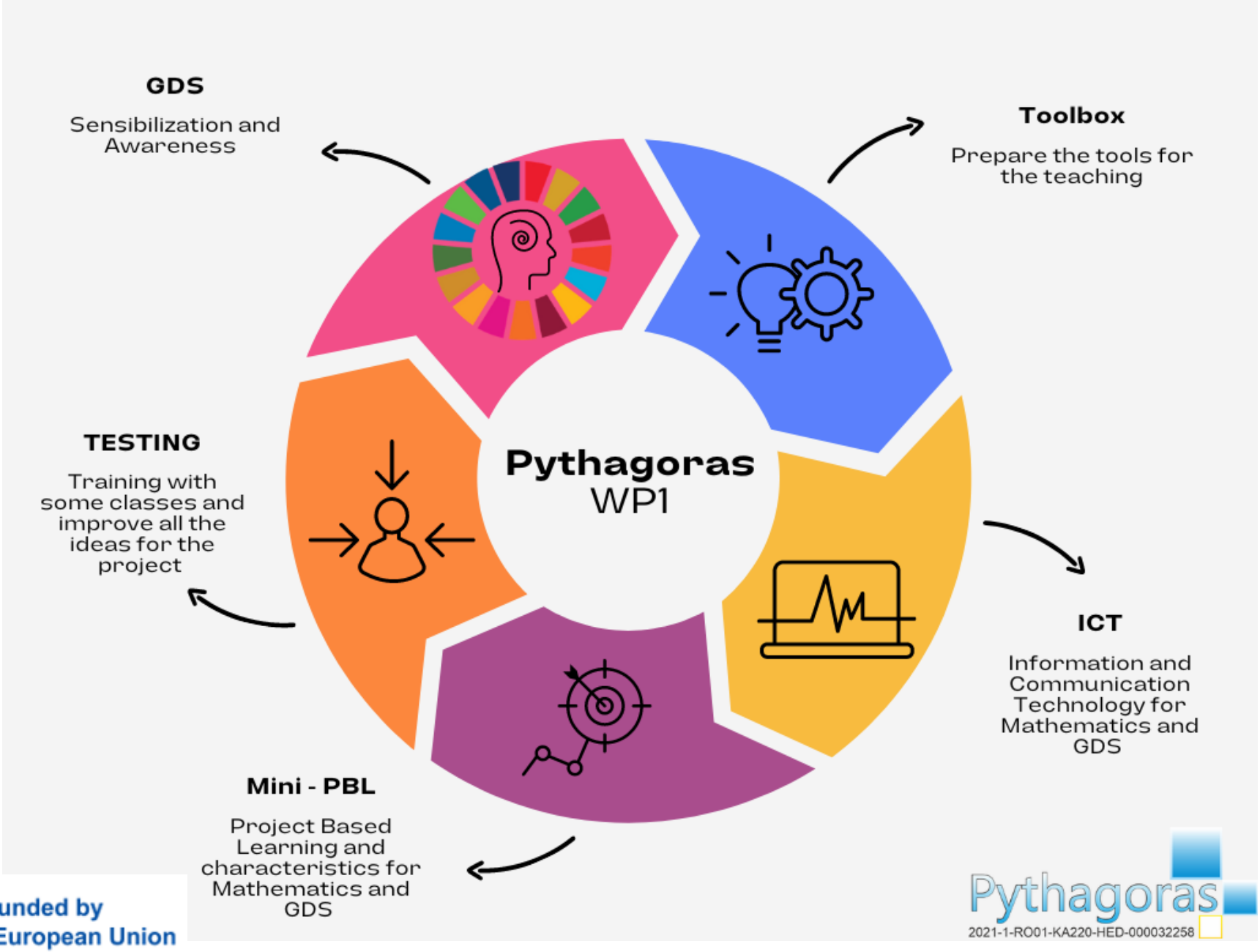
Our goals



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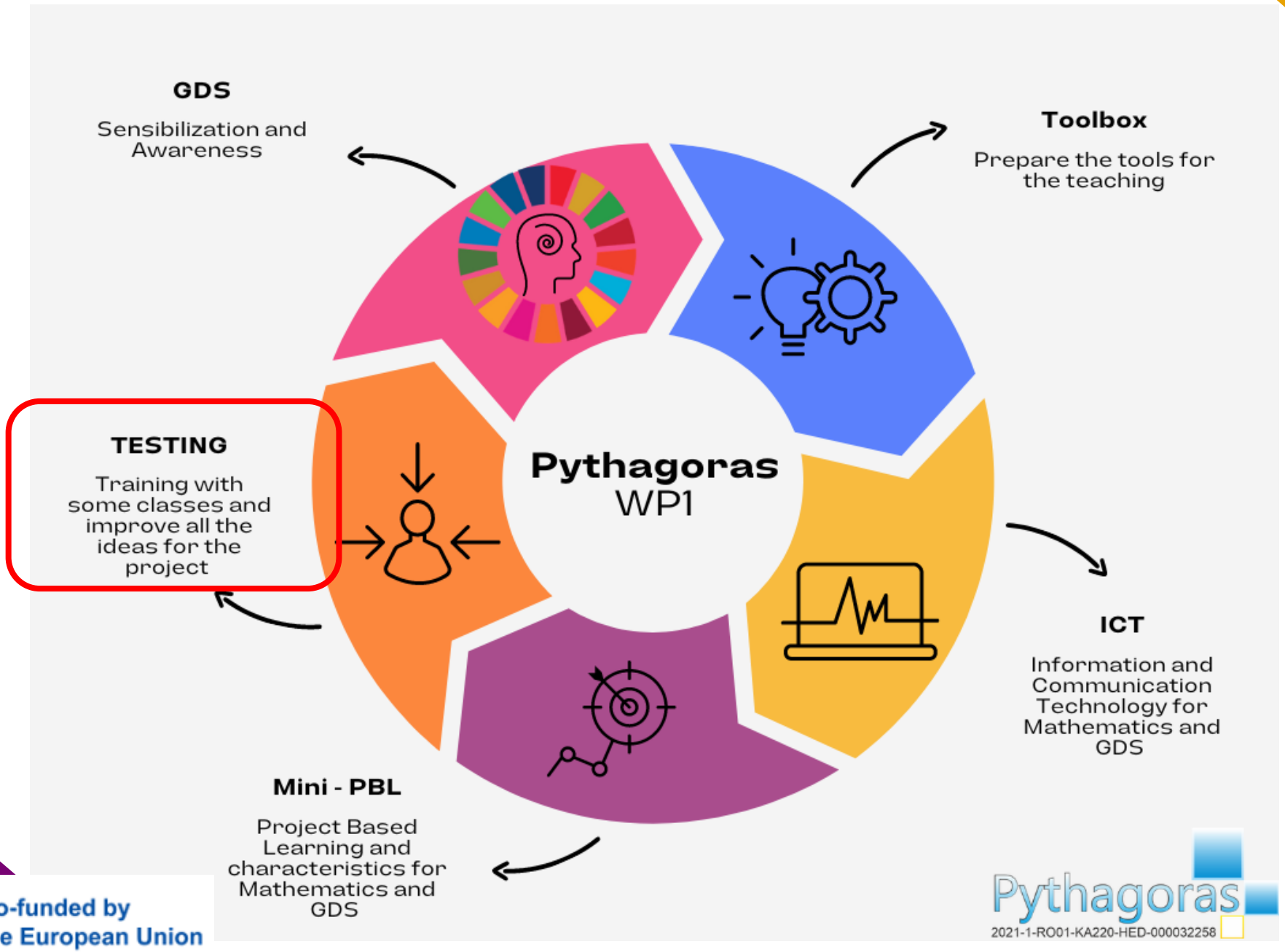

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Proposals for SDG in class

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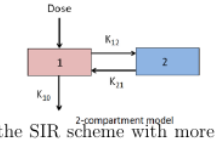
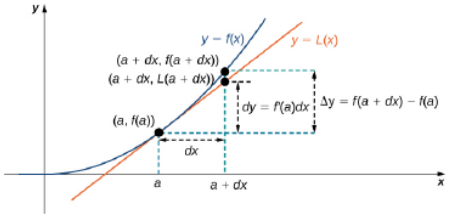
Mini-PBL project	
Teacher data sheet: Teaching Guide	
Title	The Title declares most of the project and is probably the first spark to wake the interest of students. It must be direct, clear, motivating and descriptive of the real-life issue which it addresses.
SDG attended	Using this UN graphics, we mark such SDG which this project works. 
Content units	The project may cover **2 or 3 content units**, as minimum. As the course advances, more units can be considered, but we may take care not to design a too long activity. The key concept to attend is the spiral curriculum strategy, focusing the review processes to recover students on risk to fail, and remark the connection between the content units of the course.
Sessions	Here we advance the number of sessions in the classroom we dedicate to work on this project. However, the students may know in advance that, in general, all the projects will require autonomous work, following the ECTS metric.
Hours of autonomous work	Here we may pay special attention and be careful not to generate an overtasking project. This is relevant since if you don't measure this autonomous part, the students' attitude and performance will be seriously affected. The exceed of work out of classroom affects to another subjects, impact negatively on the next mini-PBL proposed and, more disheartening for us, the goals of the mini-PBL will be displaced by the urgencies and rush (deep reflections, careful writing, checking results by different ways, discuss with classmates, etc). The worst consequence of an overtaking proposal is the cheating between students. You can introduce ways to avoid or reduce this bad practices, but regular teaching generates a high stressing workflow for both students and professors, if you have to manage additional control of the students' ethics performance.
Competences to be developed	Your subject has a list of competencies to be achieved by your students. Here is the place where those related with this project should be listed. Recall always the sense of competences, don't mix with contents to be

Guide for Teaching	
	Activity 1: The SIR system. This Activity 1 focuses on the undertanding and domain of the students of the basics on the SIR system (Eqs. (1)-(3)). In some sense, it would recover part of the presentation of the project done by the professor at classroom but it would expect to be completed by students. For example, the introduction could starts with the general compartiment model (this figure is common in pharmakinetics)  to navigate trough the SIR scheme with more sense (what does the dot blue line means?)  This Activity 1 will reinforce the capability of undertanding and communication of SIR system, and open the door to any other variant for different pathogens. **Activity 2: Numerical solution of SIR system.** Here is were we start the main mathematical work of the students. The key concept we expect will dominate this Activity is simple and known by students from High School, but probably not used: the tangent line to a curve is its best linear approximant.  So, the basic fact from first one-variable calculus course becomes the main tool of this project: $f(a+dx) \approx f'(a)dx + f(a)$. Here, DESMOS can help us with students on risk to fail. For students who need to review any characteristic about lines, slope, equation..., we can support them with the activities "Match My Line" and "Marbleslides: Lines". Moreover, for students who need to review the concept of derivative, we can support them with the activities "Sketchy Derivatives" and "Card sort: Derivative Match".

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Desmos: ICT for teaching

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- Graphing Calculator
- Scientific Calculator
- Four Function Calculator
- Test Practice
- Matrix Calculator
- Geometry Tool

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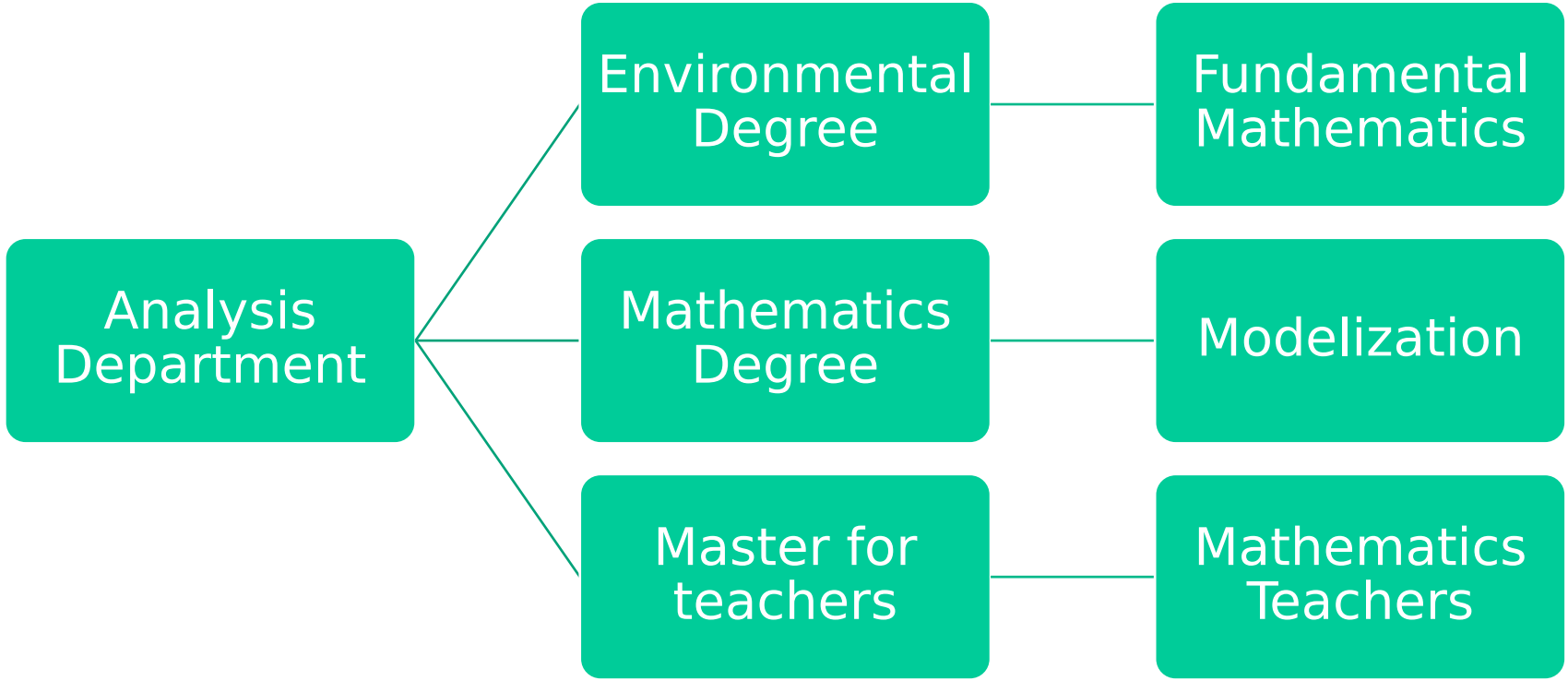

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Degree in Environmental Sciences

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- **Subject:** Fundamentals of Mathematics (6 ECTS)
- **Schedule:** 1st semester – First course
- **Profile of students:**
  - **Lowest level** of all School of Science
  - Mainly access as **alternative to other studies** whith higher demand (e.g. Biology, Pharmacy)
  - About 10% coming from **Vocational Training** (Env.& Health, Env. Education), which means at least **two years without mathematics**, but, most of them, with **job experience**
  - In general, very **low interest on Mathematics**, null vision of utility of Mathematics, and mostly **bad experience** with the subject (bad records, bad teaching-learning experiences, etc)

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Degree in Environmental Sciences

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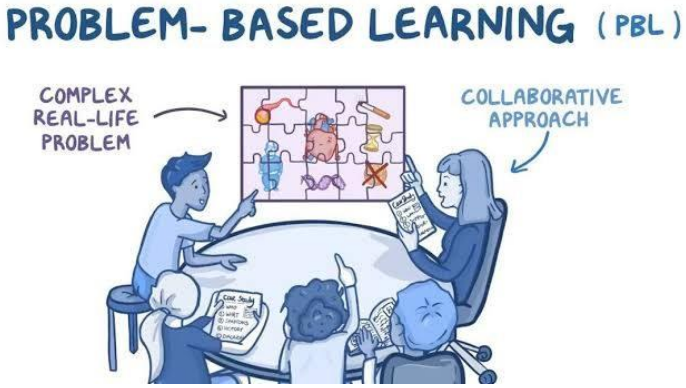
Our proposal:
Problem Based Learning approach

- **Weekly discussions** in the class about **news or reports** related with the **SDG**, taking into account the **local and the global vision**.
- **Link** the **list of problems** of each chapter to **SDG**
- Develop **problem-based learning** about the **production and consumption of energy** in the island. Taking real data.



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Degree in Mathematics

- **Subject:** Modelisation (6 ECTS)
- **Schedule:** 2nd semester – 4th course – Last mandatory subject
- **Profile of students:**
  - Product from traditional T&L method
  - Don’t use of ICT,
  - Very tired and stressed students.
  - Very low enthusiasm on new activities.

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Degree in Mathematics

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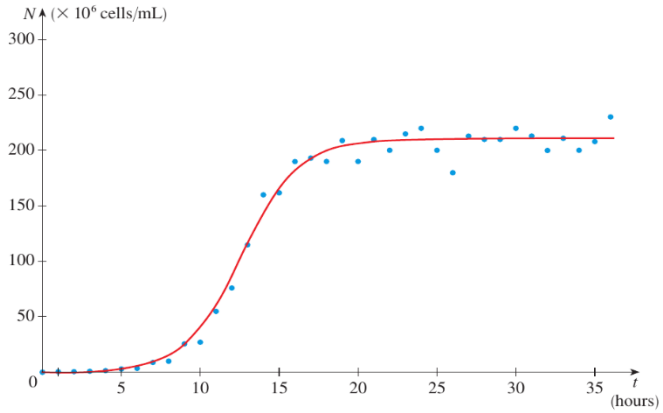
Our proposal:
Project Based Learning approach

- Work in groups
- One SDG for each group along all the course
- Develop **two projects** related with **the assigned SDG**
- One final project on **SDG #3 Good Health & Well Being**



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Master for teachers

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- **Subject:** Curricula (3 ECTS)
- **Schedule:** 1st semester
- **Profile of students:**
  - Graduated in Mathematics without teaching experience
  - **Highly conditioned** by the traditional teaching at the degree level:
    - ✓ Product from **traditional T&L method**
    - ✓ **Don’t use ICT**,
    - ✓ No experience in working in groups,
    - ✓ Not **creative activities**,
    - ✓ Not used to **innovatives T&L activities**

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Master for teachers

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Our proposal:

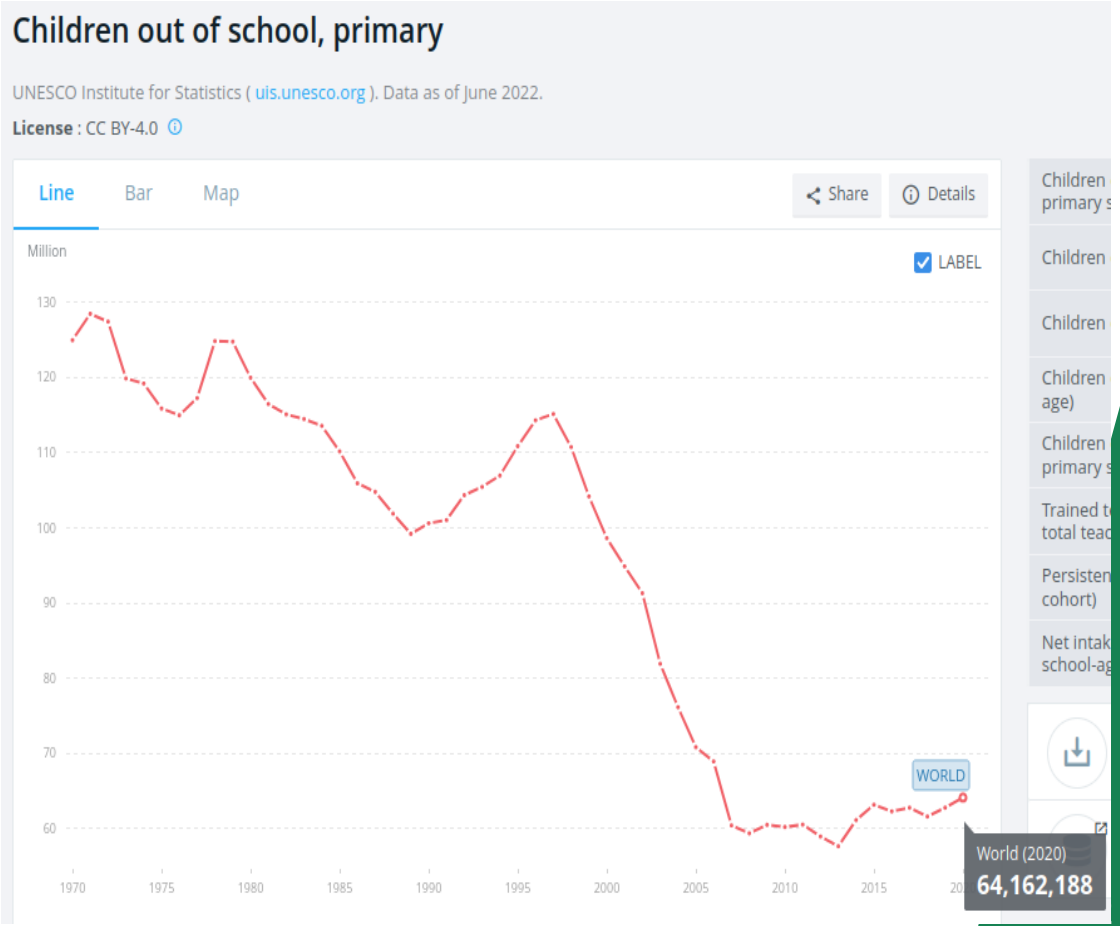
Design activities for teaching math linked to SDG

Step 0: Basic training in SDG

Step 1: develop a mathematics classroom proposal with a focus on ESD.

Step 2: Workshop showing a mathematical project focused on ESD, contextualised in SDG-4 (Quality Education).

Step 3: Review and improve the proposals done in step 1.



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Next step

Reflect on the activities tested and incorporate proposals for improvement.

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