

Marina Marchisio,

University of Turin, *The project results in Mathematics*

The Mathematics OOC, “Mathematical modelling”, is on a platform (<http://smart.miurprogettopps.unito.it>) on which the materials produced in the project are being tested. The platform sections are illustrated:



The materials are prepared directly for the students, not only for the teachers. There are currently 18.000 teachers working within the PP&S project who could use the SMART materials after the end of the project life.

The Maths OOC is for teachers but it is tested directly on students. The learning of Maths is in context and the materials are interactive, offering different paths of learning according to the students' competences.

There has been great discussion, sharing and testing of the materials within the partnership. The teachers experimenting the materials have previously been trained thanks to an online course organized by the University of Turin staff.

◀ VLE Self-training AAS Self-training ▶

ACE Self-training

Self-training on Advanced Computing Environment

-  Resource and video records: FUNDAMENTAL MAPLE COMMANDS
-  Resource and video records: A TOUR ABOUT MAPLE
-  MAPLE QUICKSTART GUIDE FOR BEGINNERS (from Maplesoft site)
-  Maple file integrated in Moodle, an example: Geometric Transformations of Trigonometric Functions

Click to download:
[Maple's template for SMART problem creation](#)

The topics for the SMART Mathematical OOC have been chosen according to the training needs questionnaire results, administered in January 2015, and to the real concrete needs of teachers which emerged from the discussion between the project partners during the international meetings. Activities both for the teachers and their students have been prepared and are now available on the platform for the experimentations in the classes.

The PP&S methodology has been really appreciated in the SMART partnership, also by those partners, like the Dutch and the Swedish, who are used to working with advanced calculation environments.

Four areas have been chosen for Mathematics:

QUANTITY (quantitative reasoning)

- Concept of number
- Use of numbers to represent quantities and qualifier attributes of the real world's objects (evaluations and measurements)
- Comprehension of the meaning of computations
- Idea of the order of magnitude of numbers
- Mental computation/elegant computation

SPACE AND SHAPE

- Recognition of shapes and patterns
- Comprehension of dynamical changes in shapes
- Two- and three-dimensional representations and their interrelations
- Capability of recognising similarities and differences between objects
- Relative position and movements in the space

CHANGE AND RELATIONS

- Representation of mathematical relations in several ways (symbolic, algebraic, graphic, tabular)
- Ability in passing from one type of representation to one other
- Capability to think in functional terms (meaning of rate of change, slope, and so on)
- Link to aspects of other key ideas (Space and shape and uncertainty)

UNCERTAINTY

- Production of data (valid methods for measuring certain features; statistic survey)
- Data analysis, their visualisation and graphic representation; concept of mean and median
- Probability

Marina Marchisio then illustrates the problem format and shows some examples of activities published on the project platform: “Capture the drug traders” and “Choosing the right accommodation”.

SMART

Science and Mathematics Advanced Research for good Teaching



Erasmus+

► Learning objectives

CAPTURE THE DRUG TRADERS

▼ Problem

An area of open sea is monitored by a radar device whose radius of action is 30 miles long.

A motorboat driven by some dangerous drug traders has been signaled, located 50 miles West and 40 miles South with respect to the radar. The criminals are going to transfer a load of illicit trade; they follow a straight path in order to reach a secret destination.

Are there any chances of intercepting them for the radar?

What regions of sea is convenient to patrol in order to increase the probability to intercept the criminals?

► Resolution

► The Mathematics behind the problem

► Bibliography

► Maple Commands-Packages

CHOOSING THE RIGHT ACCOMODATION

▼ Problem

Elizabeth and Sara are sisters coming from Florence; they are both unnyrgratuates in Milan. Elizabeth passed the test of Bocconi University; Sara, instead, attends the Polytechnic. In order to save money, the family decides to rent the same flat for both the sisters; They look for a position that requires the minimum time for daily travelling.

In the morning Sara goes to the University; she comes back home and she goes again to the University.

In the evening, before dinner she goes to volley training without coming home before. She has dinner at home and later she goes to Clara's house to study.

Elizabeth, instead, will go to Polytechnic twice a day and in the morning before having breakfast at home, she will go jogging in the park.

Which is the best position for the flat to choose?

▼ Resolution

▣ Creating the Basic Model

► Creating an Advanced Model

► Creating an Open Model

► The Mathematics behind the problem

Some of the proposed problems are those which have already been tested in the Italian PP&S Project, re-elaborated by the researchers of the University of Turin who collaborate in the SMART Project.

The methodology is the same that has been adopted for Science: from a contextualized problem to the mathematical theorization. All problems contain interactive parts on the platform and a system of automatic evaluation is used. All didactic materials on the platform contain some assignments with the possibility for students of personal paths. All students and teachers involved in the experimentation have appreciated the materials proposed.

 **2 al4 - ISS C.Anti - Liceo Scientifico S.A.**

Teacher: Paolo Marconi

 **11Q2-11Q3 St. Thomas Gymnasium**

Teacher: Ulrike Kempfle

 **I.S. "Carlo Anti"**

Teacher: Valeria Silvestri

 **St. Thomas Gymnasium**

Teacher: Stephan Markthaler

 **11A Radnóti Miklós Secondary Vocational School**

Teacher: Attila Háhn
Teacher: Márta Zsbánné Háorny

 **11BCm Radnóti Miklós Secondary Vocational School**

Teacher: Éva Szabó
Teacher: Márta Zsbánné Háorny

The font used for all activities is EasyReading, which allows even the dyslexic students to overcome their difficulties.

In October, at the end of the project life, the Mathematics OOC will be available to all people interested in the subject.

Anna Brancaccio welcomes Leila Picco and explains that her presence in the conference is motivated by the strong necessity to improve the STEM acquisition by female students as only 1-2% of them in Italy are currently taking part in the competitions dedicated to these important subjects (Mathematics, Physics, Chemistry, ICT, etc.). This number should be improved and the SROPTIMIST initiatives are going in this direction.

