



Make pupils young researchers!

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With the 2011 educational reform in France, a new course has been created in secondary schools : Methods & Practices in Science (MPS). The main goal was to improve the pupils working methods in science, including laboratory and field works. In addition, the pedagogy develops pupils autonomy and creativity, a key factor in a research process. Three teachers are working together (Mathematics, Physics and Geology-Biology), showing how different disciplines complement one another. Eventually, this is aimed at attracting more students in scientific sections. This course is optional, in the "seconde" class in French secondary schools (i.e. for 15 years old students). For the next class, they will have to choose between scientific, economic and literature sections : it is a useful option for them to decide which section has their preference.

In my high-school in Clermont-Ferrand, we have chosen a research subject on hydrogeology & water quality improvement in region "Auvergne". The pupils will have to develop and set up appropriate tools to check and improve the water quality, related to different disciplines :

- Geology & Biology: hydrogeology, effects of different pollutants on aquatic life, solutions to improve water quality (example of the natural water treatment zone in the lake of "Aydat, Auvergne, France").
- Physics & Chemistry: water potability criteria, pollution tests in water, water treatment plants working.
- Mathematics: algorithm development, modeling on excel of the dispersion of pollutants

The pedagogy of this course is new in French high-schools : pupils work in groups of three, so as to develop cooperation and autonomy. The teachers give the guidelines at the beginning of each working session, and answer the students questions when necessary.

The evaluation is competence-based : instead of a mark, which is the main evaluation method in France, the pupils have to evaluate their own skills. Then, the teachers make an evaluation, and the global process is called "co-evaluation". The final purpose for each group of pupils is to present their scientific results to the others (poster, slide show). They will have to answer the questions from their colleagues & the three teachers. Eventually, the teachers evaluate specific skills about this oral presentation.