

Session IX.1 - Science education for climate change

Climate sciences and education in France : challenges, actions, future

Philippe Bousquet, professeur

- The next 2 decades (1 generation !) are critical to develop challenging society transitions in economy, energy, and environment in order to overcome the climate crisis.
- Changing our economical model(s), deeply modifying our energy mix, or reducing the usage of fossil fuels by several percents per year are not easy objectives
- Societies need to adapt to the on-going global changes with strong iniquity between countries on available means and responsibilities
- Coordinated mitigation policies and support for a sustainable & renewed development are critical to smooth the choc and prepare the future
- In this context, the need for education of the young generations and for professional training of the “current” generations is strong and urgent, as recalled by many international organisation (UNESCO, UNFCCC, Paris agreement on climate, ...)

- In France, the education to global changes has been introduced for years in the national education system, mostly through the issue of sustainable development.
- In primary school (1 teacher per class), thanks to experimental science and practical approaches (e.g. *La main à la pâte*), children awareness (and the one of their teachers !) has been quite a success.
- In secondary school, the situation is more contrasted. Academic disciplines are separated and hardly work together, although joint projects exist now (e.g. TPE). Sustainable development is well represented in SVT (life and earth sciences) but climate sciences are not present in physics and the notion of adaptation to global changes is still mostly missing from the programmes.
- Two difficulties lay in the pluridisciplinarity and the novelty of the topics (climate change, adaptation, ...), that have not been learnt at school and university by most of the present teachers.

- A number of recommendations and actions can be envisaged in the direction of all the educational communities and their supervisory ministries, with the main objective to **provide a coordinated training for the societal relays** that are the teachers (from primary school to higher education), economic and political decision-makers, journalists (e.g. Master ACCES : climate and media)
- These forward-looking elements could be organized into **four axes of work**, as proposed by a working group from the ministry of environment :
 - To develop knowledge and **pluri-disciplinarity** about climate **change in primary and secondary education**
 - To **improve and clarify higher education** curricula and job opportunities on climate sciences, mitigation, and adaptation.
 - To support and strengthen **training for professionals**
 - To conduct **co-constructed pilot actions** in areas vulnerable to climate change and largely communicate the return of expertise.

To develop knowledge and pluridisciplinarity about climate change in primary and secondary education

- To produce and make available to all educational actors, **learning (numerical) resources** on the various aspects of climate change (e.g. videos, exercises, activities to be done in class, explanations on IPCC reports), amplifying existing actions *from la main à la pâte* or *les savanturiers*.
- **To train the trainers** : a training plan for teachers at national level is urgently needed, through onsite and online sessions (SPOC).
- To integrate **climate change**, its impacts and adaptation issues **in the programmes** of secondary education :
 - By developing the existing (SVT, History-Geography, group work such as EPI, TPE)
 - by proposing a coordinated theme "climate change" for all the levels and series of high school for the next reform,
 - By including the teachers of physics-chemistry and the professional paths in the loop
- To develop **active learning methods** (inverted classes, problem-based learning, investigative approach, group work, online projects shared internationally on eTwinning-type devices)

To improve and clarify higher education curricula and job opportunities on climate sciences, mitigation, and adaptation

- To promote the gradual conscience of climate sciences and global changes in relevant disciplinary bachelors, through **dedicated compulsory modules**.
- To identify and clarify the **skills** acquired by students and the **opportunities** (jobs/ sectors) of the existing (master) training programmes
- To identify **new job opportunities** and develop the related training programmes (e.g. climate services)
- To support and promote **research-based education**, including the strengthening of links between hard sciences and health, geography, sociology, economics, etc., on adaptation issues, as well as programmes for policy and economic decision-makers (IEP, ENA , EC, ...)

To support and strengthen training for professionals

- To develop or reinforce **dedicated training** for local authorities and companies in the framework of existing or future national regulations (e.g. French agency ADEME on methodological and technical training)
- More precisely to develop short training courses : focused thematically or sectorally, and temporally short (1-3 days), on climate change, impacts or adaptation (by agencies or research units such as ADEME, METEO France, L-IPSL).
- To participate in the production or development of digital resources enabling professionals with limited time to find suitable training.
- To integrate the needs of the professional world in the definition of the proposed training

To conduct co-constructed pilot actions in areas vulnerable to climate change and largely communicate the return of expertise.

- Possible **targeted zones** :
 - French coastal and overseas regions = regions more vulnerable to climate change
 - Areas in developing countries, e.g. semi-arid regions, coastal low altitude regions, high latitude regions, ...
- To select one or more areas and carry out **pilot actions** in the field of education and training towards a population, authorities, and companies that are at the forefront of climate change
- Such actions need to **adapt** the contents **to local situation** and impacts, and must be co-constructed with local and development actors (e.g. help of French AFD)
- The return of expertise is important to further develop such experiments