This presentation is about the relationship between research and teaching for undergraduates at Sorbonne University, more precisely at the Science Faculty that was formerly called University Pierre and Marie Curie, in Paris, France.

SORBONNE UNIVERSITÉ

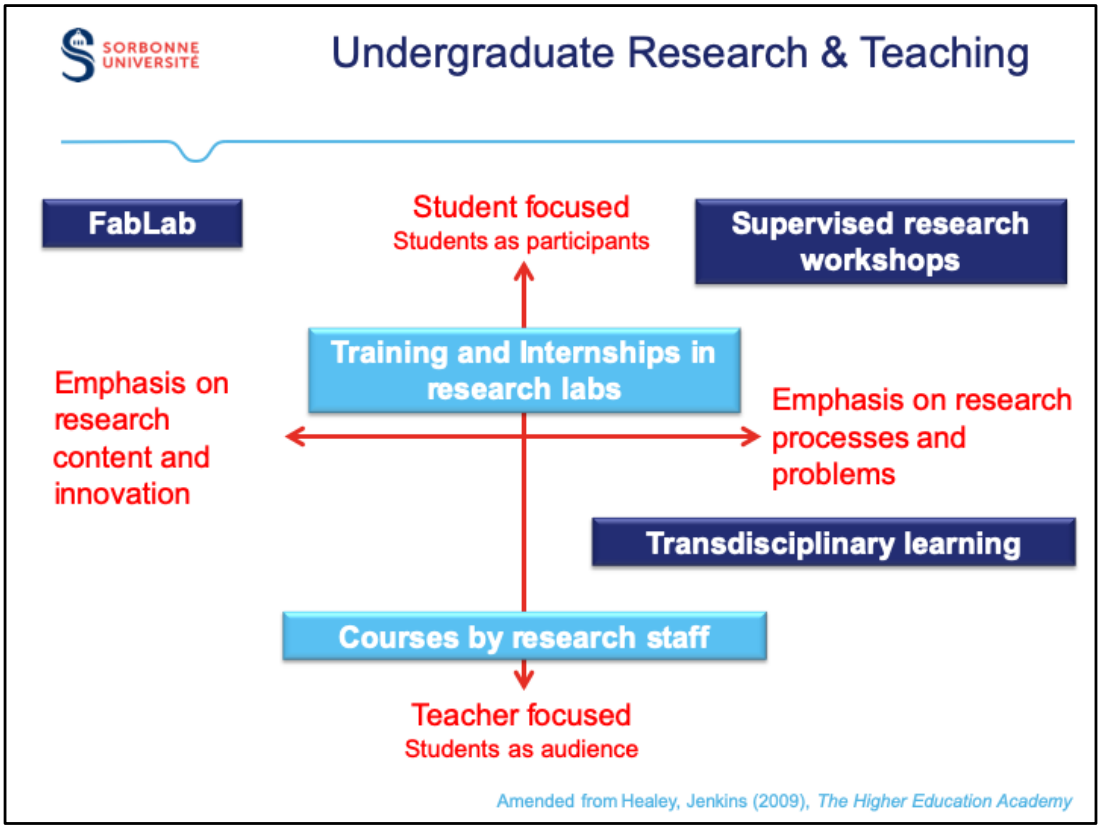
The Science Faculty
(former University Pierre and Marie Curie)

Located in the heart of Paris, **Sorbonne University – Science Faculty** embodies French excellence in **Mathematics, Physics, Chemistry, Biology, Geosciences, Engineering, Computer Sciences**

Facts and Figures:

- 20,800 students of which 2,700 are PhD students
- 3252 in staff
- 79 research laboratories
- 9,200 publications per year (approx. 11% of the publication in France)

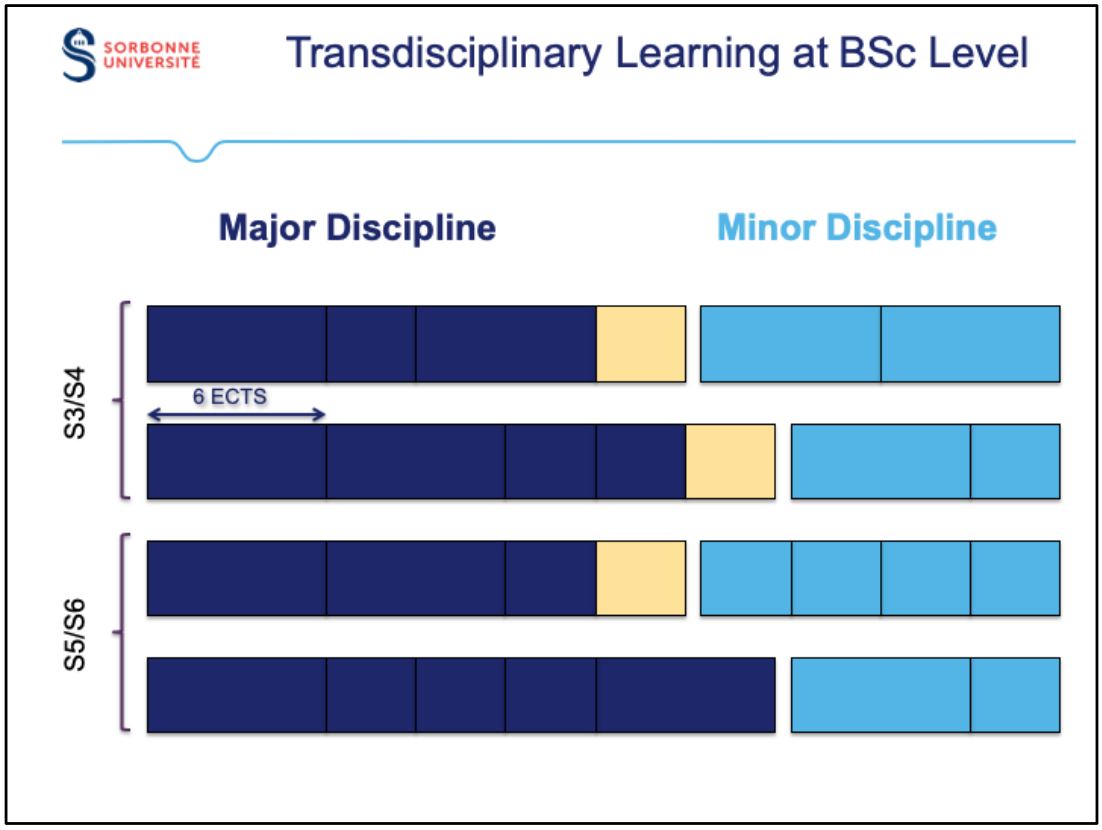
Today, we have more than 35000 students, and almost 10% are at the PhD level. There are 5000 staff members, half of them with the professor-researcher status. They work in 94 laboratories and produce more than 9000 publications per year, that accounts for more than 10% of all publications in France.



Our teaching puts emphasis on one hand on the latest research results and innovations, and on the other hand on the research methodology, the problems, processes and problem solving.

For this presentation, I use the matrix proposed by Healey and Jenkins to organize our teaching initiatives for RBL (Research Based Learning), and I will focus specifically on three points: i) transdisciplinary learning, ii) supervised research workshops for Freshman, iii) FabLab.

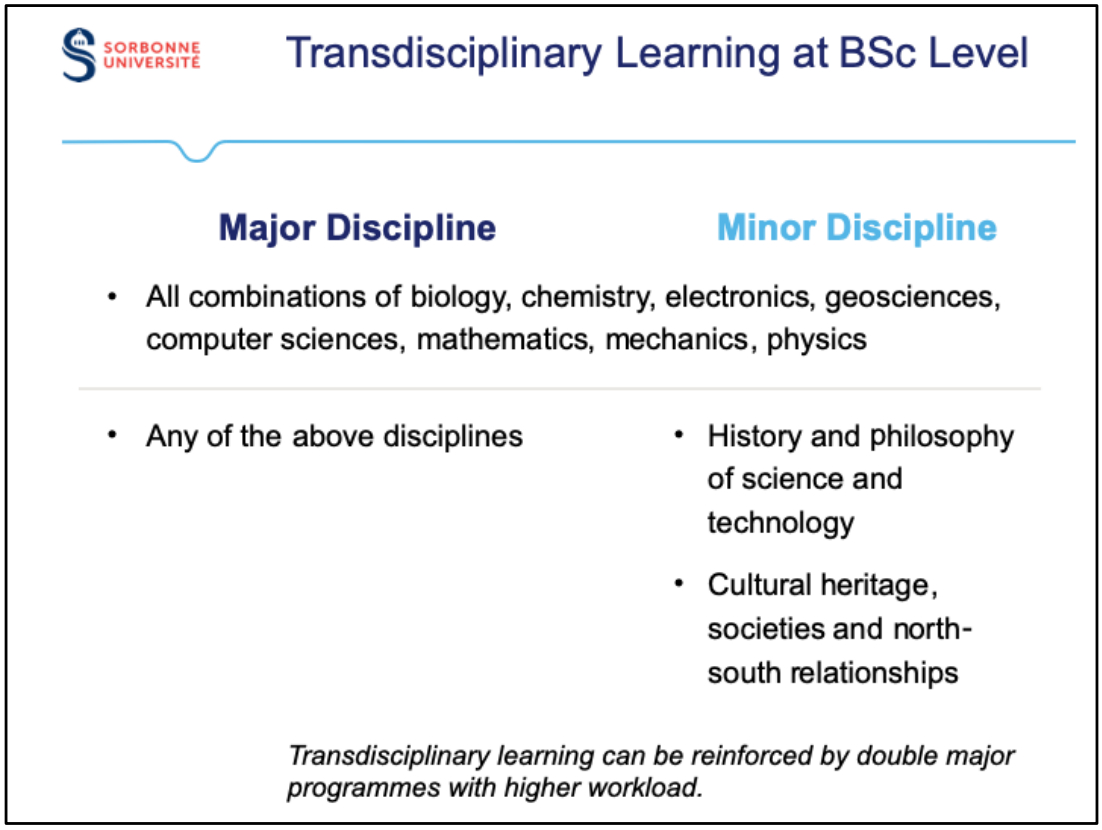
In addition, I will present the need to promote blended learning in order to realize these goals.



Each of the researcher teaches his specific discipline at the highest level. But we have organized our curricula so that transdisciplinary learning is easily possible.

Our first year bachelor necessarily combines several disciplines to teach the fundamentals and get everyone on a common level.

From the second year on, students can chose only one discipline, but they can also chose a combination of two. One as the major discipline, that accounts for about 60% of the workload and qualifies for the corresponding Master, and the other as minor discipline to enrich the education by diversified content and methods.



Within the STEM disciplines, all combinations are possible. These programs are designed for emerging professions that can combine, for example, Geosciences & Chemistry or Biology & Computer Sciences. Students are familiarized with research content and methodologies from different disciplines.

Students can also combine an even broader set of disciplines of natural and social sciences. Any of the natural sciences as major can be combined with a minor of "History and philosophy of science and technology" or "Cultural heritage, societies and north-south relationships" within the science BSc.

Double BSc programs with higher workload exist for:

- Litterature and Computer Sciences
- German studies and Sciences
- Communication studies, journalism and Sciences
- Design and Sciences
- Law studies and Sciences
- History and Sciences
- Musicology and Sciences
- Philosophy and Sciences

SORBONNE UNIVERSITÉ

Supervised Research Workshop

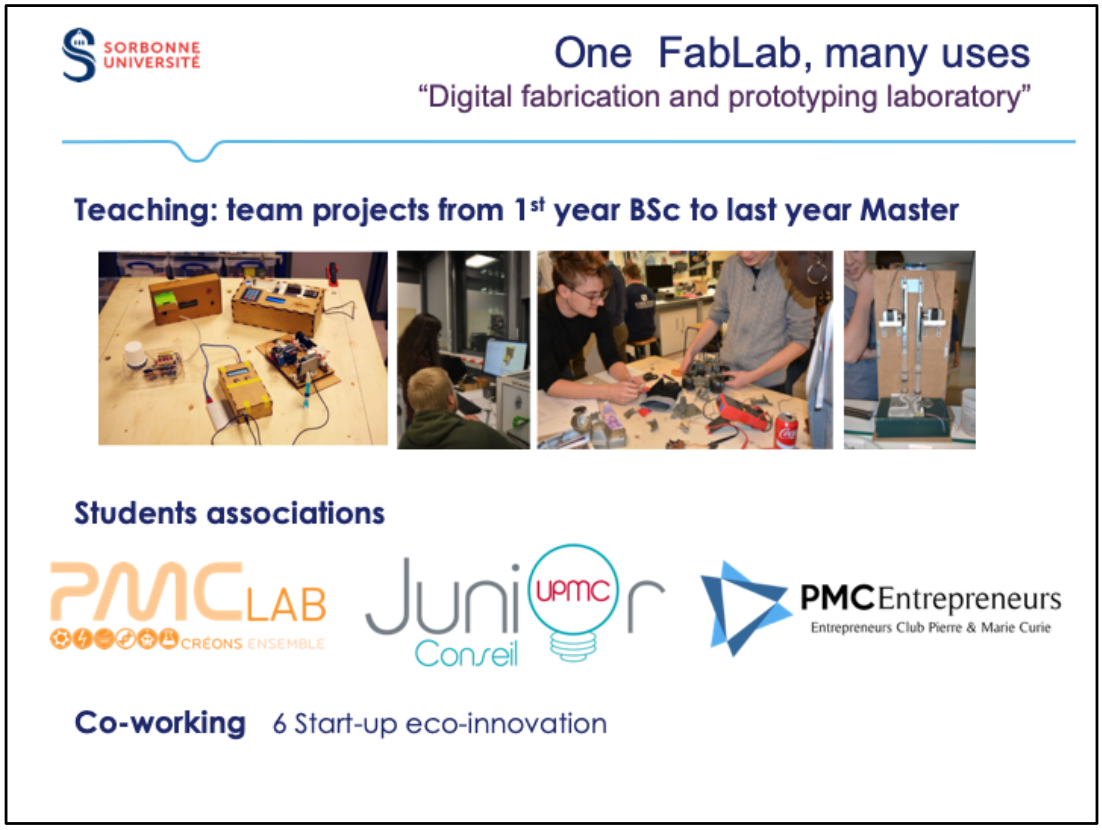
- **Acquire a scientific subject**
  - Access scientific resources
  - Select scientific information
- **Conduct scientific reasoning**
  - Define a scientific problem
  - Suggest methods of problem solving
  - Perform problem solving
  - Analyze results and conclude
- **Render the thought process**
  - Present results and discuss them

- **1st year BSc students**
- **Supervision by teaching staff from 2 different disciplines**

Supervised research workshops are mandatory for all 1st year BSc students at the Science Faculty since 2013 : nearly 1800 students in groups of 24.

They treat subjects that are necessarily combining two disciplines with their specific contents (no one discipline is the ”tool” for the other). It is important that each supervisor only represents one discipline. The combination must be done by the students, therefore enhancing their autonomy and self-learning skills.

Example: Chemistry and Informatics. The students learn the structure of atoms (chemistry) and computer programming (informatics) and must realize a program to calculate energy levels of electrons in an atom, and deduce chemical properties.



The subjects of the research workshops are of course determined by our staff. But we have also a FabLab, where students can develop their own, personal research projects.

The equipment is accessible in dedicated rooms. Chemistry and biology projects are realized in some of our teaching labs.

The FabLab is also used by teaching projects in any study year. As incentive for students, teacher often define challenges to be solved (hackathons, PBL).

Several student associations develop innovative solutions that build a bridge to businesses, industrial or start-up companies. The university ensures rigorous contracting for financial compensation.

SORBONNE UNIVERSITÉ

Blended learning

Development of an economic model

- Account for the student workload at distance and on campus
- Recognize the efforts of teaching staff

Incentive to put blended learning in place

- Promote academic development
- Task force composed by representatives of all Faculties
- Hire pedagogical support staff

The goal of program modularity and student autonomy of our RBL approach can't be reached within a rigid curriculum. Therefore, Sorbonne University is engaged in a 10-year project to enhance blended learning on all levels, but in particular on the BSc level.

We developed an economic model for courses with blended learning, that calculates automatically the student and teacher workload. It is important to check that the ECTS framework for students is respected (around 25h/ECTS) and that our teachers are fully recognized for their investment (and can continue their research duties as academics). The model is currently in inter-faculty discussions before it can be adopted by the Academic Council and released to the public.

Engagement in the transformation of teaching and learning at Sorbonne University is on a voluntary basis. We encourage our academic staff by facilitating their participation.

- We offer a great bunch of half-day courses to learn about pedagogical concepts and tools related to blended learning.
- A group of diverse representatives discusses possible approaches, and makes suggestions to the teaching departments.
- The university has created a number of open positions for pedagogical support staff.

A note at the end:

Sorbonne University is engaged in RBL for many years and has developed projects with the usual slow timeline of a large academic body. Since the Covid-19 pandemic, we are facing a pedagogical turmoil with unknown consequences. Teachers and students practice now emergency remote teaching and get acquainted with new teaching modes in very short time. It is likely that institutional strategies will have to incorporate this new reality.

This presentation gives my personal overview of some aspects how RBL is realized at Sorbonne University, based on my experience as responsible of a teaching department, as member of the Academic Council and the Commission for Teaching, Learning and Student Life, and as task officer at the teaching and learning support center CAPSULE.

I will be happy to discuss further with you, or to provide contacts with other colleagues from my university.