

Ecological transition : a call to develop a structured network within Université Côte d'Azur for exchanges on education and research

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In education : institutional commitment and current initiatives

Université Côte d'Azur is about to sign the Grenoble agreement [1], which makes it mandatory, de facto, not only to raise awareness but also to educate 100% of its students on the challenges of ecological transition.

Beyond this agreement, which demonstrates the institutional commitment of our university, efforts in this area have already been undertaken in many of its education departments to offer courses at the Bachelor and Master levels. By way of illustration, the signatories of this agreement are involved in teaching the following courses :

- Challenges of the energy transition: a 15-hour course offered to all first-year engineering students at the Polytech Nice Sophia engineering school.
- Digital and environment: a 24-hour minor offered in all Master's degrees associated with the Digital Systems for Humans Graduate School.
- Chemistry and atmospheric pollution: a 15-hour course/lab offered as an elective to first-year students in Science and Technology bachelor's degree programmes.
- Environmental problems, a 9-hour course included in the «Issues of contemporary society 2» course for first-year bachelor students in Social and Human Sciences.

The first item is an example of a generic course that presents the basic elements of the debate. The second is an example of a specialised master's course that focuses on the environmental impact of the information and communication sector and possible solutions it can offer. The third aims to raise students' awareness of environmental chemistry by addressing the phenomena of air pollution (destruction of the ozone layer and climate change). The fourth proposes an introduction to a social science perspective on these issues by exploring the mechanisms behind public issues with the aim of both understanding current institutional responses and their limitations, and seeking ways of change.

Discussions are underway to create courses within some Bachelor of Technologies (IUT) and Mater in informatics and management (MIAGE) education programs. Colleagues are intensively collaborating in an attempt to share, exchange and support each other in this pedagogical effort. Many similar initiatives are undoubtedly underway in other education departments of the university. The following insights can be drawn from our personal experience :

- The problem to be addressed is inherently systemic: it affects the entire society, and therefore requires a multidisciplinary approach, particularly at the undergraduate level. Greater specialisation can occur in graduate programmes. Research and teaching within Université Côte d'Azur and more generally in French higher education is organised to operate in silos, which complicates this collaboration. Beyond this organisation, questions arise about the neutrality of faculty members on the knowledge taught. The manifesto by the CNRS Labos1point5 think tank «Dare to teach the ecological transition» provides an overview of these questions [2]. Collaboration between colleagues in the hard sciences and the broader humanities is crucial to addressing these issues.
- Because of its multidisciplinary dimension, especially its human and societal dimension, the topic to be taught, whether it is climate change or the ecological transition, goes beyond

the usual framework of university education. The purpose in this case is not only to teach what may become profession or a line of research in the future, but what may become the environment in which our students, as future citizens, will live. The approach is no longer to provide competencies, as was strongly encouraged in recent years, but to provide an intellectual education to help citizens make decisions in an uncertain context. As faculty members, this implies the need for us to re-examine our responsibility in pointing the way to a generation of students. The task is ambitious, but it is crucial, even if it remains confusing because it breaks with the ordinary, for both teachers and students.

- We have often observed a feeling akin to anger among the young generation faced with what it considers to be betrayal by the adult world. The recent article by Julia Steinberger, author of the IPCC, who is very involved in communicating with the general public, addressed to young people revolted by the political inaction of adults is emblematic of the problem [3]. The subject to be taught therefore has an ethical dimension, which must be addressed by joint, transdisciplinary collaboration that should allow us to redefine the epistemic and ontological disciplinary frameworks in the light of the challenge imposed on our society and on faculty members alike.

These preliminary and partial ideas collected in the urgency of the moment and of the crisis that is unfolding confirm the need to develop a forum for sharing and discussing within Université Côte d'Azur. This initiative must start within our university's current structures, but it requires changes of a completely different dimension both within Université Côte d'Azur and French higher education. This new challenge cannot be added to the current assignments of faculty members, as the task is too important and time-consuming.
It is also essential to join in national initiatives, such as the recent report published on March 29, 2021 "Teaching ecological transition in higher education" by the committee chaired by Jean Jouzel [4], which advocates a 6 ECTS course of for all bachelor students, or the manifesto "Training engineers of the 21st century" [6], drafted jointly by the Shift Project and the INSA Group.
The Lyon engineering school (INSA), which is far ahead on these subjects, has developed specific courses in its preparatory cycle, as well as specialised courses that apply to each engineering field. This institution is prepared to deploy more than 30 lecturers at the beginning of the next school year, who have trained each other and are ready to face the students. The transition to a scale such as that of Université Côte d'Azur is a real challenge, which requires means of collaboration that will allow specific solutions to emerge.

In education : recommendations

In the light of these considerations, we recommend to set up, from September 2023, a teaching for all undergraduate students. This teaching should :

- Be based on content developed from multidisciplinary research.
- The course format should encourage the participation of lecturers from civil society, for example, and not be limited to lectures by experts who are bound by the constraints of their discipline.
- The teaching should absolutely be in-person, in small groups, using participative pedagogical methods. To be worthwhile and achieve results, students must be involved and have a stake in the process. Graduate students (master's or PhD students via specific financing for tutoring)

should also be involved.

- Previous experiences and feedback from colleagues in other institutions have confirmed that the human and relational aspect is essential. The program should not therefore be exclusively based on MOOCs.
- Be taught by faculty explicitly mandated by the institution, who do not consider this task a sacrifice (i.e. who do not teach these courses at the expense of more highly valued tasks).
- Be coordinated full-time by faculty members closely collaborating with the eco-responsible task force of Université Côte d'Azur.

In short, the institution must clearly and massively invest, in terms of communication but also financially, in providing these courses.

In research: transition in the laboratories

The transition challenge also has an impact on research within Université Côte d'Azur. Many laboratories are engaged in a process of measuring their ecological footprint using the GHG emission assessment tool developed by CNRS Labos1point5.

As of June 15, 2022, more than 450 laboratories in France have conducted more than 750 GHG inventories that have served as research material for the CNRS think tank in addition to helping the laboratories themselves. While an annual GHG emission inventory is a first step, many laboratories are relying on these assessments to develop a five- or ten-year ecological transition strategy to reduce their GHG emission. Labos1point5 is currently working with pilot laboratories in France and is preparing to publish, in autumn 2022, kits to help laboratories with their transition process. Once again, this issue should involve much more than the mere implementation of technical recommendations (as is also the case with education). It requires an exercise in participatory democracy within laboratories. These efforts, which have an impact on the very core of laboratory life, must be coordinated with teaching and must contribute to greater interdisciplinary exchanges at least for the purpose of consistency: how can one teach about the energy transition without being, within one's own domain, engaged in such an approach?

In research : recommendations

As in the case of developing courses dealing with the climate crisis and the ecological transition, preparing laboratories for the transition calls for creating forums of exchange between the laboratories of Université Côte d'Azur and beyond, in the local context. These physical and intellectual spaces could be a forum for exchanges on the changes required in our research itself with regard to the transition. When considering research as a knowledge project, the best way to address this systemic problem is a systemic approach in which each discipline can contribute.

References

[1]. *https://la-ctes.org/presentation-accord-de-grenoble/*

[2]. *https://labos1point5.org/reflexion/OserEnseignerTransition*

[3]. https://jksteinberger.medium.com/un-jeune-d%C3%A9sespoir-ed9df9de150

[4]. https://www.notre-environnement.gouv.fr/donnees-et-ressources/ressources/publications/article/rapport-du-groupe-de-travail-enseigner-la-transition-ecologique-dans-le

[5]. https://labos1point5.org/ges-1point5

[6]. https://theshiftproject.org/article/publication-rapport-former-lingenieur-du-21esiecle/