27. How to become an engineer in the ecological crisis?

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We live in critical times. The new generation, more than any other, has understood the necessity of seizing its last chance before dramatic consequences ensue. Indeed, the student community has been a driving force in recent years with high-profile media actions, such as Fridays For Future, calling for immediate action by economic and political leaders. Yet, we are struggling to take advantage of this closing window of opportunity. We are realizing that the principles of our world clash with the changes that are necessary and that no profound transformation has begun. As individuals, we struggle with the question “How can I make a difference?” As a group we try to organize ourselves to make our voices heard.

When we arrived at the École Polytechnique, Paris, like many of our fellow students, we wanted to get involved in the Sustainable Development Association, in order to reflect on this individual and collective possibility of making a difference. This interest in environmental issues at school demonstrates the attachment that young people have to thinking about tomorrow and to thinking about their own integration, particularly in the workplace.

It seems obvious to many of us that our values and aspirations must be taken into account in our future jobs. How can we fit into the eroding edifice of our society without contributing to its collapse? How can we work in a world of finite resources? It is indeed essential to know the impact of one’s work in one’s company but also to be aware of the underlying model. We cannot accept working for a so-called “green company” while continuing to benefit from a system that we should be extricating ourselves from.

Nevertheless, we cannot fail to note a large gap between our questioning and what the professional world can offer us. The themes of sufficiency and degrowth are obviously absent from today’s big firm models. But beyond that, the willingness of companies to change is extremely dependent on opinion and returns on investment. This leads students to mistrust big companies that are blamed for having a negative impact on the environment and of not showing much willingness to make amends.

Some students are diverting from the traditional routes. At the École des Mines ParisTech,¹ students have chosen to turn away from traditional careers, with the number of graduates joining big companies dropping from 58 per cent to 36 per cent between 2012 and 2018 (though this could also be due to a rising interest in start-ups).² Companies are beginning to notice this change among students and are modifying their discourse accordingly. They voluntarily choose to emphasize their environmental engagement, which does not go unnoticed.

At the École Polytechnique, for example, we have sponsors for each year group; these sponsors are companies that finance part of our associative life in exchange for a privileged access to the students. The last two sponsors, the aircraft builder Airbus and the oil company Total, belong to the most criticized sectors. While it is not always easy to discern the borderline between greenwashing and real change, it is interesting to note that Airbus chose the theme of the electric plane to introduce itself to us in a presentation in front of the whole school. The company Total (independently of its role as a sponsor), wants to set up an R&D centre working on the issues of decarbonated energies and artificial intelligence inside the heart of the École Polytechnique campus. One of the acknowledged objectives of this approach is to develop a special relationship with students.

While it is not yet up to the challenge and does not question the reasons for the ecological crisis, this shift in discourse is too obvious to go unnoticed. It has raised mixed reactions from students. Whatever we think of it, we, students, have played a role in this change of discourse: as a recruitment pool, our opinion matters to companies. For example, seven of the ten former CEOs of Total are from the École Polytechnique, as is the current CEO, Patrick Pouyanné, and the opinion of current promotions is therefore worth listening to. This is the idea behind the “Student Manifesto for an Ecological Awakening”, which has gathered more than 30 000 signatures in France.³ Signatories are committed to working for a company that places ecological transition at the heart of its activities. The Student Manifesto is not only pressure on companies, but also plays on the rope of sensitivity, saying to employers: “You could have been me, a student today, so understand my fears and desires, and you who are in charge today, do what you can”.

Beyond this pressure on companies, the Manifesto also highlights the gap felt by students between the courses they receive and what they know about the dangers of tomorrow. Changing the world of business, whether from within or without, requires tools for implementing the positive impact we seek. By definition, it is the education system that is supposed to provide these tools. But the education system is in resonance with the professional world, to provide it with workers capable of responding to its problems. Whatever the job, the

upcoming environmental transition is so important that any engineer must be trained to at least know what is at stake.

The current assessment of the education we are receiving is that we are not ready to respond effectively to environmental and social issues. What we feel as students in engineering school is that we are being taught “science as usual”, without it being put into the context of today’s society. Too many students can become specialists in chemistry, molecular biology, computer science, mechanics without having been made aware of the ongoing collapse of biodiversity, climate crisis, the depletion of water and soils, in twentieth-century fashion. We are not taught the consequences of what we study, which is a fundamental ethical responsibility of an engineer of our time. The teaching of environmental issues should not be decoupled from the rest of the subjects, but, rather, truly integrated into a thought process.

It should be noted, however, that there is an effort on the part of universities to try to meet the demands of students and the needs of companies for training in the concepts of transitions. At the École Polytechnique, for example, under pressure from students, a two-day seminar was set up to raise awareness on sustainable development among all students.

We immediately need a kind of philosophy of education in ecology that would not only allow training but would also integrate a deeper reflection on the stakes of our studies. For example, will the optimization advocated by our engineering studies be sufficient for the challenges of tomorrow? These are questions that we must ask ourselves and that deserve a thoughtful answer. It would certainly help to have addressed these issues earlier. In the same way that we were taught how to recycle in primary school, we should be introduced to environmental issues throughout our education.

At the École Polytechnique, our association tries to reach as many people as possible. In this context, it is not just a question of being the noisy minority, but rather of trying to be the minority that is listened to and that transmits its questions. On the one hand, we try to change behaviours and major events already existing in campus life in order to make people responsible by including them in the reflection. We also try to make people understand the seriousness of the change that is happening by relying on what is the basis of our education: science. We hope that in the future our association will no longer be necessary because newcomers will already have been trained to understand and reflect on these issues. The principle of an external body whose role would only be to deal with ecology would then no longer make sense, and that is to be hoped for.

In the meantime, it is likely that students will increasingly perceive this mismatch between what we know and feel and what is being proposed to us. Students are questioning their situation and this future that is so personal and collective at the same time. Still, crises as decisive moments should not only be seen through the prism of risk, but also understood by their potential as a cata-

lyst. While we are still struggling to grasp the risk of this ecological crisis, we must also, and most urgently, take that radical turn that seems to be the great omission in current discourse.

NOTES

1. In France, higher education is slightly peculiar: in addition to the university system, there's a Grandes Écoles system, accessible through a nationwide entrance test after two years of intensive preparation classes. The Grandes Écoles system is considered a more prestigious route, because it is more difficult to access. École des Mines ParisTech is one of the top Grandes Écoles.
2. Guillaume Lecompte-Boinet (2018), "Les jeunes ingénieurs des Mines se détournent des grandes entreprises", *L'Usine nouvelle*, 21 April, accessed 1 April 2020 at <https://www.usinenouvelle.com/article/les-jeunes-ingenieurs-des-mines-se-detournent-des-grands-entreprises.N683339>.
3. Ecological Awakening (2018), "Wake up call on the environment: a student Manifesto", accessed 1 April 2020 at <https://manifeste.pour-un-reveil-ecologique.org/en>.