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The DNA of physics

In cell culture, the physical environment plays an important role: “Everything is everywhere, but the environment selects” [1]. The education of physicists can be viewed within this framework. The Petri dish for the reproduction of physicists is a university research group. The full professor is its DNA. The selection process of new professors – new DNA – is a determining step in creating the right culture.

A passion for teaching comes first. High-quality research comes next as an essential tool for training students. Then, keeping an open mind for the outside world where 95% of our students work. Next, ‘soft’ skills determine for at least 50% if a career will be successful. Finally, integration in (inter) national physical societies and local culture is also required. In short, a healthy ‘cell culture’ is essential.

Although these requirements seem obvious, many of them are forgotten in the rat race for research funding. University should retrace its steps to honor excellent teaching, not with extra money but with respect by your peers. Effective feedback loops at the departmental level are essential for keeping track of the primary goal: stimulating talented young people to satisfy their curiosity.

Research is an excellent tool for challenging students. Erasmus grants for travel and local networks for internships at the national level prepare for the student’s career. Soft skills are learnt both on the fly and in workshops. It is sufficient to grasp the flavor of these skills: the workplace will further hone them. Each employer should invest in its employees, for creating employer loyalty and stimulating team building.

Society

Employers look for self-propelled physicists that can tackle new problems. Specific experience is not too important. Success in a job is determined by universal problem-solving skills, rapid assimilation of new information, and ‘soft’ skills like reporting and communication. A research group is the ideal training ground.

What about the image of physics? Presenting science as a medication - this is good for you - has no impact. Outreach programmes that feed natural curiosity are more successful: street performances; a physics circus; engaging teenagers in their passions like music; showing that science makes life more rewarding: these work. But this is too large a task for the physics community to handle by itself. Fortunately, there are good examples outside academia [2, 3].



University: quo vadis?

The root cause of failure in ‘cell culture’ lies in the extreme focus of groups on research as the first and only output of universities. The Hirsch index is the metric for a successful career. Management only supports this simplification. Getting the focus back on the core business of a university – students – is the road to go. This is not a plea for separating research and teaching. It is a plea for rebalancing the education of physics students.

The participation of women is lagging behind in physics. By contrast, biomedical technology and the fields of medical physicists, clinical IT specialists, and medical engineers engage 50% women. What we learn from these numbers is that the ‘colour’ of science plays an important role. Science with a human face is clearly attractive. Energy transition, ecology, and climate change also have this potential.

Improving the image of physics [4] cannot be achieved by using band-aid. The root cause lies in its DNA and the environment. ■

References

- [1] M.W. Beijerinck and L.G.M. Baas Becking, en.wikipedia.org.
- [2] www.jet-net.nl (Dutch).
- [3] www.platformbetatechniek.nl (Dutch).
- [4] Topic of VI Forum on Physics and Society, Belgrade (2014), EPN, to be published.