





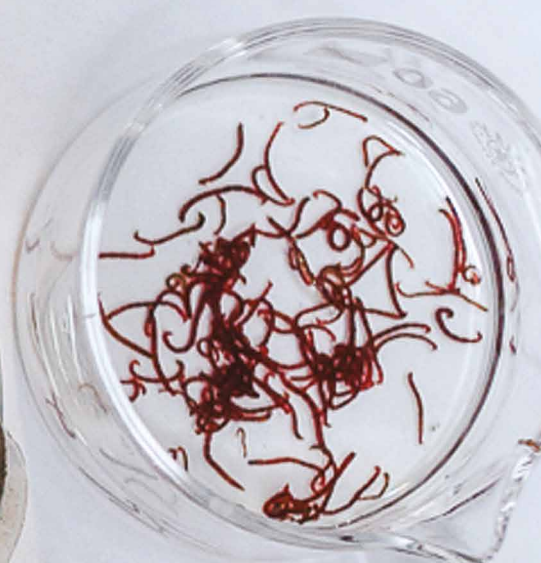
# FITTING IN WITH THE KEY OR FINDING YOUR OWN APPROACH

 Małgorzata Kłoskiewicz, PhD

 Aleksandra Nadgórska-Socha, PhD, DSc, Associate Professor  
[aleksandra.nadgorska-socha@us.edu.pl](mailto:aleksandra.nadgorska-socha@us.edu.pl)

Prof. Magdalena Rost-Roszkowska  
[magdalena.rost-roszkowska@us.edu.pl](mailto:magdalen.a.rost-roszkowska@us.edu.pl)

Institute of Biology, Biotechnology and Environmental Protection  
Faculty of Natural Sciences  
University of Silesia





*Organic farming, 100% recycled polyester, cruelty-free makeup.* When shopping, we increasingly often read labels; we are no longer only interested in the ingredients but also in the conditions under which they were produced. But what do these and similar buzzwords really mean? Isn't this just simple *green-washing*, i.e. false ecological image that manufacturers like to use in order to sell their products? The Internet tells us that being green is worth it – if not to save the planet, then perhaps for our health and the future of our children. But we need the right competencies, the basic knowledge and skills to help us make rational and responsible decisions in a world where economics still triumphs over environmental concerns. We should start acquiring these competencies from the very beginning of our education at school and develop them throughout the rest of our lives.

'A fundamental mistake of the education system in many countries, including Poland, is that in secondary schools we teach young people for the sole purpose of achieving the best possible score on the Matura exam. You have to fit in with the answer key. What good is talking about experiments, hypotheses, or chemical reactions if they are not based on any practice? Meanwhile, there are many simple activities, e.g. chlorophyll extraction, which do not require sophisticated apparatus and could be performed in a school room. But it rarely happens, which is why the changes in education are so needed. The core curriculum has been "slimmed down", but this is not the be-all and end-all, only the bare necessity to reduce the amount of material that students have to learn', says Aleksandra Nadgórska-Socha, PhD, DSc, Associate Professor of the University of Silesia, Degree Programme Director: Biology, Biotechnology and Environmental Protection at the Faculty of Natural Sciences of the University of Silesia in Katowice. According to the scientist, the material should also be differentiated according to students' interests. Everyone should acquire basic knowledge in biology, while only those interested in pursuing it further should delve into the fine details. What's more, these types of changes, at every level of education, need to be made in cooperation with specialists from various disciplines, i.e. pedagogy, psychology, and biological sciences.

'We can already notice some changes, although not yet globally. Recently, my niece was telling me about her homework assignment. It involved coming up with

a way to demonstrate how hydrochloric acid works in the stomach. So, she bought chicken stomachs and had hydrochloric acid, baking soda, and coca-cola at her disposal. She carried out the experiment all by herself and it was great! The vital difference was that there were no ready-made solutions, where she would only exercise her memory and her ability to follow instructions. Instead, there was a certain openness to creativity, to the crucial opportunity to make mistakes, and to independence. We have to teach students to draw conclusions from observation, from experimentation. Not the answer key, but your own approach to learning', stresses Prof. Magdalena Rost-Roszkowska, also from the Faculty of Natural Sciences of the University of Silesia, a chemist and biologist who studies the effects of plastics on living organisms.

At the end of 2023, the scientists took part in a symposium on modern biological education entitled 'Edukacja - czas



na zmiany. Część I: Nauki przyrodnicze' [Education - time for changes. Part I: Natural Sciences] organised by the Polish Academy of Arts and Sciences. Prof. Magdalena Rost-Roszkowska emphasises that those attending the symposium were in no doubt that changes in biology teaching are necessary. For

inspiration, we can look to education systems in such countries as Finland, Japan, and South Korea. 'Textbooks are important, but it is equally as important to put them down and get out for a trip into the woods, for example. Children learn about nature by literally touching it, and that's how it should be. Experiences are more memorable than definitions', admits the researcher.

Prof. Aleksandra Nadgórska-Socha concurs and adds that this is also the right path for secondary schools to follow.

'We can now see how pivotal green lifestyle is. But what good does it do when such issues as biodiversity or nature conservation only appear at the end of our education? Far too late for us to be able to talk about developing the right attitudes and not just those "fashionably" pro-environmental. It comes as no surprise that *green deal* and *green transformation* exist only as theoretical propositions and empty buzzwords', emphasises the scientist.

She supports her thesis by citing the results of the survey conducted among young people in secondary schools together with scientists from the Ecology Team: Gabriela Barczyk, PhD and Marta Kandziora-Ciupa, PhD.

'Even if young people are able to define biodiversity and list forms of nature conservation, they do not connect this with their actual lives in any way. They cannot answer how they could protect the said biodiversity themselves. They do not understand what sustainable development is, although they can give a proper definition of it, and they are not familiar with the term *Anthropocene*. A lot depends on the sensitivity of



teachers. They should be given proper tools to teach biology and natural sciences in a modern way'.

What needs to be done to give concepts a proper meaning and ensure that pro-environmental attitudes are not just a passing social media fad? Before the changes in the education system take hold, it is worth taking up grass-roots action.

Prof. Aleksandra Nadgórska-Socha brings up her own classes as an example.



'If we are talking about destroyed ecosystems, we go out and see the waste heaps or other post-industrial sites. When we are discussing biodiversity, we analyse untransformed ecosystems or flower meadows in the city. If we want to learn about some ordinary forest species, we don't have to travel far, we have them within a few kilometres. And if we are tackling the issue of waste sorting? Let's look for bins and see what waste sorting looks like in our towns. Then we can analyse what we have seen and discuss what could be improved'.

Prof. Magdalena Rost-Roszkowska also emphasises the importance of personal experience.

'I explain the ideas of *zero waste* and *less waste* to my child by e.g. taking him shopping. Food products and chemicals with a short shelf life are usually discounted, but that doesn't mean they are inferior in any way. It doesn't mean that the day after the expiration date they should be thrown away. We buy them not because of the price, but precisely so they don't end up in the bin', says the researcher. 'When I see students with

drinks in disposable cups with straws made of plastic, I tend to point out those seemingly insignificant things. I recommend carrying your own cup and a metal straw. I have such a set myself', she adds.

The topic of plastics is important to Prof. Magdalena Rost-Roszkowska who invites biology students to participate in her research projects.

'They carry out a biological experiment as part of their studies. It is fascinating how students get involved in this activity', she explains. In her group, the scientist proposes a topic related to her research. The results are very good: 'My group brainstormed and the young people planned an experiment. The first one didn't work out so well, so they met again and analysed what went wrong. The second one turned out successful. At the end, we reviewed the subsequent stages together. I saw in them people who were committed to the topic and were able to spend hours in the lab to find a solution. Suddenly, they began to wonder what the sandwich bags that many of them pack their lunches in every day were made of, and how the rubbish that is generated in this way can affect different organisms. It is worth mentioning that students have the opportunity to present the results of their analyses at scientific conferences, and their names are often featured in scientific publications as co-authors.

Prof. Aleksandra Nadgórska-Socha also emphasises the importance of involving students in the scientific activities of university employees. The Biology Experiment module is an example of such an activity, but there is more to it: this is also an offer for those choosing to become teachers. Thanks to this experience, they can then apply similar methods in primary and secondary schools. It is an interesting way to learn critical thinking, activity planning, data analysis, and drawing conclusions.

A novelty in the educational offer for, among others, biology students at the University of Silesia is area-based education allowing them to select additional thematic modules to study. These may include: artificial intelligence and data analysis: methods and tools, which is perfect for people studying biology. There are also other areas to choose from, such as creative expression and critical thinking, the boundaries of science, personal development and health, and civil society and entrepreneurship with a legal vademecum. On the other hand, those studying other degree programmes can choose modules related to biology, from the area of natural environment and technology, i.e. catastrophic elements and green technologies. In this way, they gain skills that they can successfully implement not only in their scientific discipline but also in everyday life. They have the opportunity to better understand what the aforementioned buzzwords, such as the *Anthropocene*, *global warming*, and *biodiversity* stand for and to be more sensitive to cases of *greenwashing*. What's more, they might also analyse their regular daily activities and think about what they can actually do for the environment.



It is never too late to change your attitude. Therefore, we should undertake extensive educational activities to shape the proper pro-environmental attitudes. These activities will help young people understand the modern world and give them new, much broader competencies. Both researchers are firmly convinced that it is a worthwhile undertaking.