

Breakthroughs 101: Training innovators to solve global problems

An expert workshop at the Science | Business
“R&I in recovery” conference, 22-23 February 2021

How can Europe create more innovators?

To discuss the need for innovators and how education can help address it, the annual Science | Business Network conference brought together experts from the worlds of business, policy and education in two conference sessions: a workshop February 22, and a plenary panel Feb. 23.

Speakers:

Olivier Crouzet
Head of Pedagogy
École 42

Georgi Dimitrov
Head of Unit for Digital Education
Directorate General for Education, Youth, Sport and Culture, European Commission

Isrka Mihaylova
Member
European Parliament

Ilkka Niemelä
President
Aalto University

Moderator

Carlos Haertel
Member of the Board
Science | Business

Workshop speakers:

Kalevi Ekman
Director & PDP Professor of the Aalto Design Factory
Aalto University

Apurva Ganoo
Masters student & IDBM Community Manager
Aalto University

Ana Noronha
Executive Director
Ciência Viva

Jonathan Wareham
Professor of Information Systems
Esade Business School

Moderator

Richard L. Hudson
Editor-in-Chief
Science | Business

ATTRACT is an EU-funded consortium of major European research infrastructures, universities and business. It funds the development of breakthrough imaging and sensor technologies. As part of its work, it has been piloting a new innovator-training programme.

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How can universities teach “entrepreneurial grit”?

Technology is moving fast: artificial intelligence, quantum computing, gene editing. To prosper, Europe will need more innovators, the people who can take an idea from a lab and get it ready for market. But how do we get them?

The answer: In part, by training them at universities – with new approaches, new teaching methods. And across Europe right now, many experiments in innovator-training are underway.

A few examples:

- In France, **École 42**, a not-for-profit coding school started by a local software entrepreneur, ignores all previous entry qualifications and sets its own rigorous selection tests for would-be students, regardless of their academic history. The aim is to spot “hidden talent,” said Olivier Crouzet, its head of pedagogy. Would-be innovators need an “agile state of mind,” because “not everyone is ready to be creative” or to “solve our global problems,” he said. “We do need our students to be able to progress and to adapt very quickly if they want to be able to have a sustainable career.”
- The EU-funded **ATTRACT** project takes its cue from the Design Factory Global Network, begun by Aalto University in Finland. Its partners, including high-energy physics lab CERN and Esade Business School, teach students by challenging them to design products that will solve real problems. Innovator education “must be related to real life problems,” said Kalevi Ekman, the Aalto professor who pioneered the method. Real problems “are often fuzzy. They can be wicked; we have never enough information; we have never enough resources.”

- The **European Institute of Innovation and Technology (EIT)** brings academia and industry together to innovate – and includes extensive entrepreneurial education programmes. The EIT and the Horizon Europe research programme, which funds the EIT, demonstrate that “talent development can be a core part of research and development policy,” said Georgi Dimitrov, head of digital education at the European Commission’s Directorate General for Education, Youth Sport and Culture. He said it’s important to get more universities involved in the EIT and to extend their work into under-served parts of Europe.
- The EU’s **Erasmus+** student-mobility programme is another important part of the training system – especially for students from diverse regions of Europe. “It is a benefit to have the opportunity for movement and exchange of experience of young people,” said Iskra Mihailova, a Bulgarian Member of the European Parliament. “That’s why we appreciate so much programmes like Erasmus.” On the other hand, different regions of Europe need to give young people more reasons to stick around, she said.

Thinking like an innovator

How you think is key to entrepreneurial success in new technologies. “Becoming an innovator or entrepreneur requires the right mindset,” said Ilkka Niemelä, Aalto president. “Nobody’s actually born with these kinds of competencies, so we need to help people grow to be innovators and to be entrepreneurs, and I think we need to start early.”

While many innovators do well academically, that’s not what makes them innovators, said Esade professor Jonathan Wareham. “What really separates them is their entrepreneurial grit and problem-solving capabilities, and their ability to bring creativity and ingenuity to solving complex problems in systems.”

“How do you teach a person to make things happen in a city administration, where you have to climb the greasy political pole of these institutions that aren’t transparent? That’s what innovators do.”

Learning how to gamble

Innovators take risks: they pursue projects that could easily fall flat. If a project is obviously going to succeed, there’s a strong chance somebody else has already done it and succeeded, so doing it again can hardly be called innovation. That’s why, besides teaching skills, it’s also important to give students opportunities to take risks, and to take on challenges where they might fail, Aalto’s Niemelä said.

But the current educational mould teaches students to fear failure and does not prepare them to solve real-world problems. Ana Noronha, executive director of Portuguese science-education organisation *Ciência Viva*, said academic disciplines are taught in rigid silos where there is “an excessive focus on examinations.”

To illustrate how innovator training can work, one Aalto student, Apurva Ganoo, described his own experiences at Design Factory’s affiliate, ATTRACT. He and his fellow students were charged with finding uses for an advanced kind of rainfall sensor

developed by a Dutch team funded by ATTRACT. They spoke to managers of sewage systems, responsible for preventing floods – a reasonable guess at a possible market for the new technology. But they were told that, whatever the advanced technology’s potential, these companies were unlikely to adopt anything this new for the next five years or so. Back to the drawing board.

Then COVID-19 struck and confinement rules made hardware prototyping of any possible device difficult. So the student team moved their thinking on-line. They created a mobile app to raise awareness of the technology. It’s an online game, in which players place virtual plants around Rotterdam. They can then see, based on the micro-climate rainfall data, which plants grow where.

The experience shows flexibility and a willingness to fail are key to innovation. Conventional exams are “good to get the baseline knowledge,” Ganoo said. But they may also “lead to believing that there’s only one right answer.”



Ilkka Niemelä, President of Aalto University

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Conclusions

- Not everyone is cut out to be an innovator, so universities need to select the right students for innovator training programmes.
- Innovators can come from all walks of life, and traditional entry requirements could bar many of them from educational institutions.
- The earlier potential innovators can be found, the better, so that their talents don’t go to waste.
- Innovators may or may not do well academically—what marks them out is their “entrepreneurial grit,” and ability to solve problems with limited information.
- Innovator education needs to deal with real-world problems. Over-emphasis on exams fails to teach students to take risks.
- The crossover between innovation and education means innovator training should also be part of research and innovation policy, which can bring together companies and universities to design new educational programmes.
- These educational networks should extend into under-served parts of Europe, complementing the advantages of student mobility.