LMRO Partnership Initiative
Enhancing Labour Market Relevance and Outcomes of Higher Education

Peer Learning Activities
2nd International Policy and Practice Seminar on

Widening access and attracting students to fields with high labour market demand

Country Chair: Austrian Federal Ministry of Education, Science and Research

Seminar Brochure

17 February 2022 – virtual Zoom meeting

The LMRO Partnership Initiative benefits from the financial assistance of the European Union. The views expressed in this document cannot be taken to reflect the official opinion of the European Union or of the Organisation for Economic Co-operation and Development.

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About the LMRO Partnership Initiative

Technological advances, climate change, the digitalisation of the economy and exogenous shocks such as the COVID-19 pandemic are transforming labour markets. Today's students and workers must adapt to changing tasks and jobs, acquiring skills that allow them to perform new jobs and updating their skills throughout their lives. The fast pace and uncertain nature of labour market changes also present challenges for higher education institutions (HEIs): they must anticipate new and emerging jobs and skill needs, create study programmes that are relevant to changing labour markets, and rethink how to communicate with learners on future careers and with employers on graduate skills. Governments, for their part, face the need to re-examine how their portfolio of policies – funding, monitoring and labour market data systems – can better support learners and institutions in responding to these challenges.

To support policy makers and HEIs in their shared commitment to enhance the labour market relevance and outcomes (LMRO) of higher education, the European Commission and the OECD launched the LMRO Partnership Initiative in 2019, a collaborative project with the participation of Austria, Hungary, Portugal, and Slovenia.

Through policy analysis, peer-learning activities and the development of a self-reflection tool for use by HEIs, the project contributed to building national government and higher education institutional capacity to implement future higher education policy reforms. The project informed and supported the European Strategy for Universities, linking its planned aims to national and institutional contexts and encouraging the transformation of the higher education sector.

Peer-learning activities

The four peer-learning events of the LMRO-PI were designed for policy makers and practitioners to review innovative national policies, identify enablers and barriers to innovative institutional practices, and discuss key findings from research. The aim was to (i) facilitate peer learning, (ii) identify key questions relevant for policymaking and the adoption and upscaling of effective institutional practices, and (iii) stimulate and contribute to an international policy debate. The online events gathered an international audience of higher education policy stakeholders, including policy makers, leaders of HEIs, teaching and administrative staff, higher education researchers, and representatives of quality assurance bodies, industry and student unions.

30 November 2020	17 February 2022	24 February 2022	3 March 2022	10 March 2022
Using labour market information to improve learners' choices and curriculum	Widening access and attracting students to fields with high labour market demand	Raising study success through student support and improved career-study linkages	Stimulating innovation through inter- and transdisciplinarity in education and research	Supporting improvement in teaching and learning to address students' needs and labour market demands
	Country chair: Austria	Country chair: Slovenia	Country chair: Hungary	Country chair: Portugal

Download seminar brochures at: https://www.oecd.org/education/higher-education-policy/

For more information on the LMRO Partnership Initiative, please contact: HigherEducation@oecd.org

Seminar summary

Study and labour market information for STEM and doctoral students, and adult learners

The session explored the following questions:

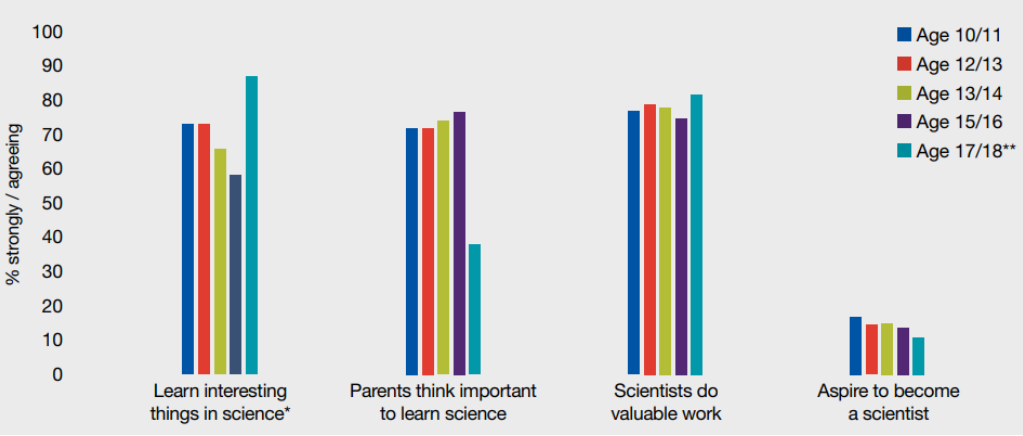
- What pedagogies in school engage youth and, in particular, girls in science, technology, engineering and mathematics (STEM) subjects?
- What are key characteristics of successful collaboration between HEIs and schools in study guidance?
- What labour market and study information do prospective and current students need to make informed study and careers choices?

Innovative science pedagogies and effective ways to provide labour market and study information to learners to raise their interest in STEM subjects

Interview: **Louise Archer**, ASPIRES, UCL Institute of Education, United Kingdom, (Karl Mannheim Chair of Sociology of Education) was interviewed by **Helga Posset**, Federal Ministry of Education, Science and Research, Austria (National Co-ordinator LMRO Partnership Initiative).

Since 2009, the ASPIRES project has tracked a cohort of young people from age 10-23, with large-scale surveys of 48 000+ young people to date, at ages: 10-11, 12-13, 13-14, 15-16, 17-18 and 20-22. In-depth longitudinal interviews were conducted with 50 students from age 10-21 and their parents (800+ interviews).

Most like science, but few aspire to be scientists



Source: ASPIRES report 2019

What are the characteristics of successful science pedagogies?

- Those that focus on changing practice – not the young person
- Focus not just on science knowledge/skills but also on identification with science – too many young people feel it is alien and 'not for them'
- Foregrounding equity/social justice – shifting power, changing what/who is valued, addressing the practices and relations that create the uneven patterns of participation in the first place
- E.g. The (Primary and Secondary) Science Capital Teaching Approach – a 'mind set' approach (works with any curriculum) that supports teachers towards more socially just pedagogy. Co-developed over six years with primary and secondary teachers (free to access handbooks). Data shows impact of the approach on students' engagement and identification with science, their 'science capital' and their science aspirations and participation.

How can public policy support this?

- Invest in supporting teachers' understanding and critical reflective practice – invest in meaningful professional development and time for reflection (individually and collectively)
- Whole school/department approaches are most effective

How to provide labour market info to youth?

- Can embed in teaching, but this is not the most important thing. Many young people 'know' that science is a good career, but they do not feel it is 'for them'. Labour market info alone will not change this – it assumes a rational choice model. The real key is to close the gap that young people experience between themselves and science and to make science more meaningful to them, relating it to their everyday lives, interests and aspirations.

What can public policy do to scale up current practice?

- Provide the right, supportive conditions for education systems, schools and teachers
- Science teachers do not naturally 'know' this stuff and it is rarely a main part of their training
- Shift from funding short-term, one-off and individualised approaches to longer-term, more focused ones
- Better joining up of initiatives – quite fragmented, competitive and confusing market. Create pathways for progression.

Read more about ASPIRES, access free handbooks and resources; and contact: l.archer@ucl.ac.uk.

Collaborations between higher education instututions and secondary schools

Interview: IMST – Innovations Make Schools Top (IMST), previously: Innovations in Mathematics and Science Teaching, **Franz Rauch** (Head of the Institute of Instructional and School Development) and **Konrad Krainer** (Dean of the Institute of Instructional and School Development), University of Klagenfurt, were interviewed by **Tibor Baráth** (Managing Director) Qualitas T&G Ltd. and Kodolányi János University

Improving the teaching of mathematics and science in secondary schools in Austria

IMST started as a research project on innovation in the teaching of mathematics and science and then opened up to other subjects. The project (1998-1999) outlined suggestions for improving the teaching of

mathematics and science at secondary level in Austria. From 2000-2004, IMST was continued as a development project with the aim of fostering innovation within secondary schools and proposing a long-term plan for making improvements. The proposal was to establish a nationwide support system for STEM teaching in Austria (at all levels). Since 2005, some of these measures have been implemented (e.g. establishing national and regional competence centres, regional networks), some have been partially implemented (establishing a fund for teachers submitting innovative projects), and some have not been implemented at all (establishing a subject-related education management at the school level).

Support for pre-service and in-service teacher training

IMST supports pre-service and in-service teacher training through teaching materials and a teacher network. The main idea is help teachers become "reflective practitioners". As part of this, teachers are asked to prepare "innovation papers" of around 20 pages. Young teachers often have no idea what innovative teaching means, but they can get inspiration from producing these papers as writing down ideas to be read by others is a way to reflect on their own work. Teachers are also encouraged to look at critical moments in classroom management and teaching practice. IMST has an online search engine with teaching materials, including 1 600 innovation papers.

School principals are important enablers for innovative approaches in teaching. IMST research shows that if teachers are supported by their principal, they, in turn, show flexibility to their students. Hence, teacher development needs to be interlinked with institutional development. Principals have an incentive to participate in IMST because of the implicit benchmarking effect.

What can public policy do to scale up current practice?

Negotiations on the continuation of IMST are underway between representatives of the Austrian Federal Ministry of Education, Science and Research, universities, and university colleges of education. The suggested new IMST action plan aims at building a nationwide professional development system for schools, with an emphasis on subject-specific didactics, subject-related collaboration among teachers, corresponding autonomous activities supported by school principals, individual school professional development strategies supported by educational administration and policy, and accompanying research. A pilot project could be to work with a selection of schools aiming to establish or further develop an existing focus on STEM subjects.

Read a brief description of the initiative: IMST - Innovations Make School Top (Austria).

Examples

- ***Circus of Knowledge***, a new artistic venue on the university campus dedicated to connecting science and art, **Airan Berg**, Johannes Kepler University Linz (Circus Director)
- How subject teachers in secondary schools can play an important role in raising interest in STEM subjects:
  - ***Young scientists***, **Katharina Heidel**, Johannes Kepler University Linz (School marketing and university communications)
  - ***Environmental Protection College*** in Slovenia **Gasper Gantar** (Director)
  - ***TECHtalents***, **Johanna Röttl**, University of Klagenfurt (UNI Services)
- Raising interests of girls in STEM:
  - ***ADA Wien*** and ***Tagebuch der Informatikerin***, TU Vienna, **Mihaela Rozman** and **Martina Lindorfer**, (Co-ordinator Women in Informatics)

- Innovative pedagogy in STEM subjects: ***Informatics-Lab*** (***Informatikwerkstatt***), **Stefan Pasterk**, Alpen-Adria-Universität Klagenfurt (Deputy-Head of Department of Informatics Didactics)

The **Circus of Knowledge** is a new artistic venue on the university campus dedicated to connecting science and art to convey scientific topics through artistic means and to stimulate the interest of people of all ages in research and science. It will be an interdisciplinary, intercultural, inclusive, intergenerational and participatory experience.

Subject teachers in secondary schools can play an important role in raising interest in STEM subjects by illustrating how subject-specific theories, the foundations of which are taught in secondary school, are applied in daily life and through on-the-job practice. An engaged subject teacher can also have a positive effect on parents and care-givers, who tend to play a fundamental role in study and career choices in secondary school and earlier.[1] ***Young scientists***, the initiatives of the ***Environmental Protection College*** and ***TECHtalents*** are examples of hands-on experiences that allow secondary school students to see the societal relevance of study programmes and aspire to potential roles in society they could achieve through higher education.

Project ADA (*Algorithmen Denken Anders* – Algorithms Think Differently) is a three-year educational outreach programme of the Vienna Centre for Logic and Algorithms at the Vienna University of Technology (TU Wien). ADA's aim is to communicate scientific concepts, social implications and the strategic importance of algorithms, the building blocks of digitisation, which in turn is of decisive importance for innovation, growth, employment and competitiveness. The project is named after Ada Lovelace (1815-1852), who is considered the first computer programmer, which is already an indication that one of the project's aims is to address the gender bias around computer science among the general public.

The **workshop series *Tagebuch der Informatikerin* (Diary of a Female Computer Scientist)** is an initiative of the project ADA. By participating in the workshops that take place, schoolgirls aged 13-15 across Austria get the opportunity to a) gain an insight into the life and work of female computer scientists and ICT workers, b) reflect on their beliefs and possible stereotypes about women in computer science, c) reflect on their own skills and career aspirations, and d) ask questions and establish personal connections. In light of the COVID-19 pandemic, the workshop series switched to a virtual SpeedMentoring series open to boys and girls aged 11-17.

The **Informatics-Lab (*Informatikwerkstatt*)** offers a diverse range of materials, changing thematic focuses and regular workshops to support instructional design, enable new ideas and experiences, and encourage both children and adults to try out, marvel, explore and discover. Topics like modelling and diagrams, algorithms and programming, robotics, Boolean algebra, binary numbers, encryption, networks, and computer systems can be found in the various workshops and materials offered in the lab.

Read brief descriptions of the initiatives: Circus of Knowledge (Austria); JKU Young Scientists (Austria); Outreach activities to secondary schools, Environmental Protection College (Slovenia); TECHtalents (Austria); ADA – Algorithmen Denken Anders (Algorithms Think Differently) (Austria); Diary of a Female Computer Scientist (Tagebuch der Informatikerin) (Austria); Informatics-Lab / Informatikwerkstatt (Austria).

[1] For an analysis of current institutional practice, what HEIs can do to upscale current practice in their collaboration with secondary schools, and a set of policy options for public authorities to support HEIs in this, see (OECD, forthcoming[2]) for an analysis of Slovenia, and (OECD, forthcoming[3]) for an analysis of Austria.

Spotlight on guiding study choices of learners seeking upskilling and reskilling

Interview: www.universitairdoorleren.nl, Universities of the Netherlands: A platform providing information for prospective adult learners, Annemieke van Barneveld-Biesma interviewed by **Duša Marjetič**, Head of Higher Education Division in the Slovenian Ministry of Education, Science and Sport and National Co-ordinator of the LMRO Partnership Initiative in Slovenia

Time, financial implications and expected return on investment are key considerations for learners who seek upskilling and reskilling. For people who are busy with their working lives, easy access to pertinent and comparable information on study programmes is particularly important for making study choices. Universities of the Netherlands (UNL) developed a website - www.universitairdoorleren.nl , which went online in November 2021, containing all online and offline courses for professionals. These courses range from post-graduate master's degrees for professionals to one-week short courses. Professionals can look to expand their skillset to adapt to the changing economy (broader multidisciplinary skills, new technologies, etc.). Following the recent introduction of learning vouchers with an annual entitlement of EUR 1 000 for lifelong learning, searches for educational offers below EUR 2 000 have increased significantly.

An important outcome with policy relevance is that the collation of information on online and offline courses for professionals into one platform has stimulated a dialogue between public universities (and the higher education sector more generally), employers, and government authorities about the role of higher education in the provision of lifelong learning and continuing education.

In total, it took two years to develop the website. A major question has been how to define what falls under upskilling and reskilling, and what courses to offer. To answer this question, surveys/research were conducted with university graduates and alumni. 95% of alumni over 30 claimed they wanted to return to higher education for lifelong learning, but had no time for or interest in doing a master's degree. Alumni already know that the educational offer comes from a valid system if it is related to their university – there is a high level of trust in the quality of the educational offer. What they need are new insights in their field and to build on the skills they already have.

In terms of the cost of building and marketing the website, this amounted to EUR 200 000, the highest cost single item being the public marketing campaign. The universities had dedicated project managers (one for the website and one for policy, i.e. which courses, how to reach professionals, etc.) that tried to keep the costs as low as possible. The process also helped to professionalise the back offices at the universities, which is now relevant for the maintenance of the platform. UNL's role is to facilitate how universities reach out to lifelong learners and how they become competence brokers.

A significant concern is support for teachers that facilitates them teaching a different audience. Teaching professionals is a different skill from teaching students.

Read why the initiative was launched, key achievements, success factors and barriers, national policy support and plans for further development: A platform to provide information for prospective adult learners (Netherlands).

Study guidance and successful transition into higher education

The following questions were explored in the session:

- What practices support (under-represented) students to find the right study programme and transition successfully to higher education?
- What are innovative HEI onboarding practices that provide support for a successful start in fields with high labour market demand (e.g. STEM)?

Study guidance from a prospective student perspective

Interview: **Magdalena Hangel** and **Johannes Ruland**, Austrian National Federation of Students in Higher Education (ÖH) Studieren Probieren and Studienplattform.at, interviewed by **Andrea-Rosalinde Hofer**, OECD

Connecting secondary schools and HEIs

Studieren Probieren was launched in 2009 by the Austrian National Union of Students with the aim of connecting secondary schools and HEIs, guiding prospective students in their higher education choices and helping them to navigate the high number of study programmes. In the winter semester 2021/22, almost 6 000 prospective students participated in the initiative. A priority target group is “first academics”, i.e. prospective students who are the first in their families to enter higher education and who would not otherwise have had the opportunity to get an authentic taste of higher education.

Studieren Probieren is an Austrian-wide study taster initiative, offered by the National Austrian Student Association, that starts in secondary schools and offers prospective students guided visits to HEIs organised by students in higher years.

A team of students visits secondary schools

The process starts with a team of students visiting secondary schools to present their experience of higher education to class groups and in one-to-one meetings and smaller groups. Students have diverse backgrounds and language skills and come from different fields of study. The next step is for students to sign up for an accompanied visit to an HEI and programme of their choice. This gives prospective students the opportunity to reflect on whether the study programme, the HEI and the location could be a good fit for them. This is a very different first experience compared to visiting a higher education fair. A current student will accompany a group of prospective students to a lecture and will answer any questions related to the study experience, student life, housing and work. It is free for prospective students to participate in these guided visits.

The initiative is based in Vienna, but relies on a network of local students to organise visits to HEIs across Austria and was created, developed and is run by students. Every ‘guide’ knows the nuances of their field of study and can therefore give authentic help to prospective students, plus they are young enough to remember their first steps into higher education themselves.

Studienplattform.at is an online search engine for all higher education degree programmes in Austria. The aim is to support prospective students, education counsellors in schools and *Studieren Probieren* guides by offering up-to-date and verified information, given the rising number of programmes each year. *Studienplattform.at*, an online search engine run by the Austrian National Union of Students, seeks to provide this kind of information, giving online study guidance from a student perspective. The platform has been run, since 2010, by the Austrian National Union of Students as a “search engine from the students' perspective”, which offers basic information (e.g. curricula, ECTS, hyperlinks to relevant websites of HEIs), information on different types of entrance examination (particularly for students with a non-linear transition),

application deadlines, contact details of student representatives and information on occupational fields of work related to the study programme.

What can public policy do to scale-up the initiative?

Both initiatives receive funding from the Austrian Federal Ministry of Education, Science and Research. Going forward, the Austrian National Union of Students wishes to increase its efforts in impact studies and expand its "train-the-trainer" programme for guides.

Collaboration between different actors is crucial to the initiative's success. In its early years, *Studieren Probieren* lacked a public profile, meaning teachers and guidance counsellors in schools were initially reluctant and cautious to engage. However, this has all changed, due to the positive response of participants and the growth of the programme.

Schools can facilitate the work of *Studieren Probieren* by allowing their pupils to attend the information meetings. The initiative could reach more school pupils if the visits were embedded into the school curricula.

One improvement to *Studienplattform.at* that the Austrian National Union of Students seeks to develop is to offer more video-based content. There are plans to merge *Studienplattform.at* and other public websites into a joint study guidance web portal.

Read brief descriptions of the initiatives: Studieren Probieren (Austria); Studierplattform.at (Austria).

Supporting 'first academics' in a successful transition to higher education

BeFirst!, **Aurora Alonso** (Co-ordinator) and **Michael Schnabl** (Mentor), University of Klagenfurt and Studienkompass of the Stiftung der deutschen Wirtschaft, **Nandita Wegehaupt** (Co-ordinator) interviewed by **Verena Regent**, WPZ Research

A key policy challenge is that study guidance does not reach all students equally. In particular, students who are first in their family to enter higher education often lack information on the academic requirements of programmes.[2]

BeFirst! was launched in 2019. The three most important things for prospective students to know about BeFirst! is that (i) it is an open-ended process – even though it is offered by the University of Klagenfurt, it does not necessarily have to lead them to study at this university; (ii) engagement in the programme is confidential, teachers are not informed; and (iii) the programme is open to all secondary school pupils in the Carinthia region (53 schools). The programme is delivered by students to students to reduce barriers.

BeFirst! also offers support for students in their first year at university: students can ask any questions they may have, no question is a stupid question. In addition, a course of two ECTS credits is offered in the first year, which is an effective supplement to the one-to-one mentoring. The course is focused on orientation, but also writing, as writing is a significant challenge for students who have often had a bad experience of writing from school. They learn about different writing styles and learn how not to procrastinate. In general, students taking part in the initiative have good results and their dropout rate is 5%, which is lower than the average dropout rate among all students.

[2] For an analysis of current institutional practice, what HEIs can do to upscale current practice in guiding student choice and supporting the transition into higher education, and a set of policy options for public authorities to support HEIs in this, see (OECD, forthcoming[2]) for Slovenia; (OECD, forthcoming[3]) for Austria; and (OECD, forthcoming[4]) for Portugal.

The aim of ***Studienkompass*** in Germany, developed and implmeneted by the *Stiftung der Deutschen Wirtschaft* (sdw), is to widen access to higher education. The three most important things for pupils to know about *Studienkompass* are: (i) you get to know your potential, which is worth discovering; (ii) the programme comprises a full curriculum with many interesting courses; and (iii) the programme lasts for three years: two years at secondary school and one year in higher education. Students with non-academic family backgrounds are a very diverse group, so the programme has improved its selection process and now has a greater focus on those growing up in a situation of risk in terms of access to higher education and dropping out, in particular related to employment, funding and language. At *Studienkompass*, particular focus is on the transition phase for students from difficult backgrounds, which can be a challenging time during which some students change their minds and decide not to study at all. *Studienkompass* offers individual support during this period, when everything is new and insecurity is at its highest. Students also gain new perspectives on why they are learning and get help to see the bigger picture, rather than focusing all their attention on a course they do not like. The *Studienkompass* App was launched just before the COVID19 pandemic, with the aim of supporting effective learning and providing information. Many parts of the App are free of charge for people outside the programme.

From 2017 to 2021, the sdw implemnted on behalf of the German Federal Employment Agency (*Bundesagentur für Arbeit*), a nationwide project "**Effective support for career guidance**". The aim was to train career counselors in employment agencies and teachers in upper secondary schools to develop coordintated approaches in study and career counselling.

Read brief descriptions of the initiatives: BeFirst! (Austria); Studienkompass (Germany); Effective support for career guidance (Germany)

Examples

Interview: **Katharina Schröder**, TU Vienna interviewed **John M. Burdick**, NYU Student Success Office about their use of ***nudging*** through text messages for student support, and **Saúl Neves de Jesus** about the ***"Soft skills for life" course*** at the University of Algarve to reduce dropouts in the first year

The first year can be challenging, particularly in study programmes where students have different levels of previous knowledge. Prospective students need to know what academic support is available to support them during the first year. Accessing this information can be difficult, particularly if student support is organised at faculty level.

The **NYU Student Success Office** is using "nudging" through text messages to increase the take-up of student support services. The nudging approach has been taken for the last two and a half years based on text messages to undergraduate students that are part of the global campuses. Initially, the text messages were targeted at students in science courses who were experiencing difficulties. Due to the success of the approach, it was expanded to all first- and second-year students. Currently, 13 000 students receive text messages twice a week. Messages and content are written centrally, and front-line students answer replies to the messages. There was much positive feedback from students that this encourages take up of support services, even though there were reservations in the beginning. In terms of challenges, data management has been the trickiest issue, since students often change their phone numbers.

The **University of Algarve's initiative** "Soft skills for life" is an online course with 12 modules on competencies to reduce dropouts in the first year. For the time being, the programme is optional, but the idea is to make it mandatory. Currently, there are around 300 students per year doing the course, which is a low number given that the university has 8 000 students. Some students do not finish the course because extra-curricular courses are not valued. An initiative with similar objectives is the **Soft Skills Lab at ISCTE** in Portugal which was started in 2009 to support non-traditional students during their first year.

Read brief descriptions of the initiatives: Student Success Office at New York University and their use of nudging (United States); "Soft skills for life" programme (Portugal); Soft Skills Lab (Portugal).

Curricula design and delivery that support a successful start

The following questions were explored in the session:

- How can curricula design and delivery help study programmes attract qualified prospective students with diverse profiles to in-demand fields and facilitate early study success?
- What are innovative approaches in academic orientation and tutoring?

Designing curricula to facilitate early study success

Panel discussion moderated by **Barbara Gabriel**, Deputy-Dean for Internationalisation at the Department of Mechanical Engineering of the University of Aveiro*:*

- **Klavdija Kutnar**, Rector of the University of Primorska on: Opening in-demand STEM programmes to graduates from related fields with high shares of women, and designing curricula to ease successful transition
- **Istvan Fabian**, former Rector of the University of Debrecen on: Importance of research groups and ways to integrate transferable skills development in doctoral degree programmes:
- **Elisabeth Oswald**, Cybersecurity AAU, Director of the Cybersecurity Research Group, University of Klagenfurt on: Easy theory and applications in the beginning of programmes
- **Stefan Koch**, Vice-Rector for Education, Johannes Kepler University Linz on: Applications in the beginning and peer groups for inclusive learning
- **Filomena Soares**, Vice-Rector for Education and Academic Mobility, University of Minho and President of the Portuguese Society for Engineering Education (SPEE): Implementing multidisciplinary project-based learning

The first year in a study programme can be challenging. The panel discussion highlighted the following practices that HEIs have introduced to facilitate early study success:

- Explaining the relevance of subjects or parts of the curricula to students in the context of potential future careers can help them develop a broader understanding of the profession/s related to their study programme and can also enhance study engagement.
- Programme co-ordinators, teaching staff, and those responsible for the design and delivery of student support services see positive effects on the learning culture and autonomy of students through the use of labour market information in study guidance, and during the first year to illustrate fields of knowledge application.
- HEIs have adopted an increased focus on multidisciplinary project-based learning and transversal skills development to enhance study skills, for instance, teaching students to find and solve challenges they encounter in their daily lives.[3]

[3] See (OECD, forthcoming[4]) for an analysis of higher education practices in Portugal to enhance multidisciplinary project-based learning and transversal skills development.

Academic orientation and tutoring from a (ex-)student perspective

Panel discussion moderated by **Kurt Matyas**, Vice-Rector for Education, TU Vienna

- **Ziva Ledinek**, University of Maribor (Department of Anatomy, Histology and Embryology)
- **Antonio Rebelo**, Student tutor at the University of Aveiro
- **Márton Balogh**, University of Pecs (President of the Doctoral Student Association)

The panel discussion highlighted the following points on academic orientation and tutoring from a student perspective:

- Tutors provide another feedback loop for teachers to see what they can improve. At the same time, this is also one of the challenges, because professors/mentors can feel threatened thinking that tutors can correct their work. The trust between tutors and professors is therefore of great importance. “We learn by teaching others”.
- Tutoring can guide students in their higher-level study choices and specialisations, also for doctoral studies, as direct pathways into higher-level studies are common and students often remain at the same university where they completed their previous degree.
- In addition to academic support with cohort building, tutoring develops transversal skills.
- It is important that student tutors receive training, support and recognition for their contribution, for example in the form of a certificate (e.g. on leadership and communication skills).
- Tutoring services also can help students returning to complete their study programme after having paused or suspended their studies.

Read brief descriptions of the initiatives: Excellence in Engineering Education, University of Aveiro (Portugal); Open Day - Doctoral Student Association (Hungary)

Brief descriptions of the initiatives

These descriptions have been provided and drafted by the relevant organisations themselves and have not been edited or amended by the OECD. Any questions relating to the initiatives should be addressed to the contact provided.

IMST - Innovations Make School Top (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	Innovationens Make School Top (IMST). Orgininally: Innovations in Mathematics and Science Teaching
Website (if available)	https://www.imst.ac.at
Name of organisation implementing the initiative	Federal Ministry of Education, Science and Research and University of Klagenfurt, together with a network of collaborating institutions
Year it started and ended/is expected to end	1998, still running
Contact	Prof. Dr. Konrad Krainer, konrad.krainer@aau.at, University of Klagenfurt, Department of Instructional and School Development, Sterneckstrasse 15, 9020 Klagenfurt, Austria
Short summary of the initiative	
The research project *IMST* (1998-1999) worked out suggestions for improving mathematics and science teaching at the secondary level in Austria. In the period 2000-2004, IMST was continued as a development project with the aim to foster innovations at secondary schools and to propose a long-term plan for improving the situation. The proposal was to establish a *nationwide support system* for STEM teaching in Austria (at all levels), consisting of *seven measures* to be taken. Since 2005, some of these measures were implemented (e.g., establishing national and regional competence centres, regional networks), some partially (establishing a fund for teachers submitting innovative projects), some not at all (establishing a subject-related education management at the school level). At the moment, negotiations regarding a sustainable anchoring of IMST (2023) between representatives of the ministry, of universities, and of university colleges of education are running.	

Why was the initiative launched?

The initiative was launched as a reaction to Austria's disappointing TIMSS 1995 results at the upper secondary level. In addition, further studies at the primary and secondary level, including TIMSS and PISA, had been drivers of prolonging IMST.

What are key achievements?

Regarding the reason for launching the initiative, a comparison of Austrian mathematics and science students' achievements at the primary level (TIMSS 2007–2019) and at the secondary level (PISA 2003–2018) with the neighboring countries Czech Republic, Germany, Hungary, Italy, and Slovakia gives some answers. The comparison shows that - regarding significant differences between Austria and the other five countries - Austria improved (e.g., overtaking Germany in primary mathematics). Given the low number of mathematics lessons at the primary level and a reduction of STEM lessons at the secondary level in 2003, the improvement of Austria is rather surprising. It is assumed that the implementation of the above-mentioned measures contributed to compensate the unfavorable general conditions.

What do you think were the key success factors?

Linking subject-related and organizational issues, building on interdisciplinary reflections, negotiations between communities, visibility and support in society (societal rationality approach). This means taking a long breath, having patience, looking beyond borders, and involving a constructive intention by all stakeholders. IMST research using the diffusion of innovation theory and self-determination theory highlights the particular relevance of teachers' need for competence as well as relative advantage and trialability as important dimensions for disseminating innovations.

What do you think were the barriers?

Interconnecting individual and organizational learning, balancing between bottom-up and top-down, challenges for building up resources in subject didactics in Austria.

If you were to start again, what would you do differently?

We would aim at establishing a contract between the implementing institutions for a longer period (minimum 5 years, not being dependent on political changes and on 1-3 year-negotiations) in order to guarantee sustainable support for schools, strong accompanying research and good collaboration between policy, practice and research.

National policies/programmes support the initiation/implementation/development of the initiative? If so, how?

The responsible ministries supported the initiation, implementation and development of the initiative through financing, negotiating goals and impact, discussing challenges and further developments.

Do you have plans to further develop the initiative? If so, what are they?

The suggested new IMST action plan aims at building a nationwide professional development system for schools, putting an emphasis on subject-specific didactics, subject-related collaboration among teachers at schools, corresponding school autonomy activities supported by their principals, individual schools' professional development strategies supported by educational administration and policy, and accompanying research. A pilot project could be to work with a bundle of schools aiming at establishing or further developing an existing focus on STEM subjects.

Any additional information

Selected references:

Krainer, K. (2021). Implementation as interaction of research, practice, and policy. Considerations from the Austrian initiative IMST. *ZDM - The International Journal on Mathematics Education*, *53*(5), 1175–1187. https://link.springer.com/content/pdf/10.1007/s11858-021-01300-y.pdf

Krainer, K., Zehetmeier, S., Hanfstingl, B., Rauch, F. & Tscheinig, T. (2018). Insights into scaling up a nation-wide learning and teaching initiative on various levels. *Educational Studies in Mathematics*, *102*(3), 395–415. https://link.springer.com/article/10.1007/s10649-018-9826-3

Rauch, F. (2013). Regional networks in education: A case study of an Austrian project. *Cambridge Journal of Education, 43*(3), 313–324.

Circus of Knowledge (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	Circus of Knowledge
	https://www.jku.at/en/campus/the-jku-campus/buildings/circus-of-knowledge/
Name of organisation implementing the initiative	Johannes Kepler Univesity
Year it started and ended/is expected to end	Starting now... indefinite
Contact	airan.berg@jku.at

Short summary of the initiative

The Circus of Knowledge is a new artistic venue constructed on the campus of the Johannes Kepler University dedicated to connect science and art to convey scientific topics through artistic means and to excite people of all ages for research and science. It will be an interdisciplinary, intercultural, inclusive, intergenerational and participatory space bringing together professional artists and scientists, future artists and future scientists (arts & science students) and citizen artists and citizen scientists (all other members of the population)

Why was the initiative launched?

The initiative was launched to create a space that connects arts and science and develops artistic interventions of high quality with scientific merit. It is also geared to reach out to young audiences and excite them about science and research and the innovative work done at the university.

What are key achievements?

he initiative is in preparation phase so it is difficult to write about key achievements. The key achievement of the preparation phase can be defined in the great interest among researchers to participate in the artistic projects on different levels.

What do you think were the barriers?

The main barrier at this preparation stage is to create a common vision of the space as many artists have to learn to interact with scientists and the scientists need to look at their research differently in order for it to be translated into artistic interventions for different age groups.

If you were to start again, what would you do differently?

As we are just starting we probably need to make all the mistakes we are making in order to later know what we need to do differently.

National policies/programmes support the initiation/implementation/development of the initiative? If so, how?

There are various funds on national and regional levels (i.e. Sparkling Science or Peek) that can support such initiatives.

Do you have plans to further develop the initiative? If so, what are they?

We are interested in further developing the initiative through international collaborations that can promote the idea and disseminate the results of our artistic research on an international level.

JKU Young Scientists (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	JKU Young Scientists
Website (if available)	https://www.jku.at/youngscientists
Name of organisation implementing the initiative	University Communications – Johannes Kepler University Linz
Year it started and ended/is expected to end	2009 – to present
Contact	Katharina Heidel (katharina.heidel@jku.at)

Short summary of the initiative

The JKU Young Scientists program was created for school students age 15+ who have a strong interest in chemistry, engineering, computer sciences, mathematics, and physics. Each program consists of several workshop sessions held by JKU professors and researchers. Students attend these workshop sessions during the school year when taking their regular classes at school. The program gives these school students a unique opportunity to become more familiar with an academic environment at the university before graduating from school and learn more about various academic degree programs. Program participants can also complete a summer internship at a JKU institute or at a partner company, thereby diving deeper into the subject area.

Why was the initiative launched?

The program was created to give school students an opportunity to learn more about the university, academic studies, and subject areas offered at the university, even before completing their secondary education. The objectives include providing more insight into STEM subject areas, particularly academic degree programs, as well as holding workshops held by JKU students and researchers to show these students just what research is focusing on in these fields.

What are key achievements?

Participants have an opportunity to:

- get better acquainted with the JKU Linz and its academic faculty members
- connect with the university before completing their secondary education
- take part in hands-on, thought-provoking workshops and try out what they've learned in the classroom
- take part in a technical or scientific-oriented internship during the summer
- learn more about degree programs and fields of study to try and pinpoint a major after graduating from school

What do you think were the key success factors?

A key success factor has been - and continues to be – strong collaboration with schools, educators, and industrial companies in Upper Austria.

The topics are also not only very interesting and stimulating, they change constantly and this makes sure that the program content is always up-to-date.

JKU faculty members continuously modify and update the content in line with current research studies and this not only attracts students to the program, but also keeps them interested.

What do you think were the barriers?

Barriers included attracting and encouraging students from schools that are not technically/scientifically oriented to take part in the program

National policies/programmes support the initiation/implementation/development of the initiative? If so, how?

The following have – and continue to - support the program:

- Upper Austrian Directorate of Education (sending promotional materials to schools, advertising the program in a newsletter,...)
- Talente OÖ (supporting the program on their homepage, in their newsletters, providing interested students with information,...)
- Educators (supporting the program and providing students with information about the programs as well as giving them promotional materials,...)
- Industrial companies located in Upper Austria (by providing students with summer internships opportunities)

Outreach activities to secondary schools, Environmental Protection College (Slovenia)

Key facts about the initiative	
Country	Slovenia
Name of the initiative (in English/in the local language)	Outreach activities to secondary schools at the Environmental Protection College
Website (if available)	www.vsvo.si
Name of organisation implementing the initiative	Environmental Protection College (Faculty of Polymer Technology, University of Nova Gorica, University of Novo Mesto)
Year it started and ended/is expected to end	2017
Contact	gasper.gantar@vsvo.si

Short summary of the initiative

Environmental Protection College offers the following activities to secondary schools:

- Participation in our lecturers at science days or similar event at secondary schools (topics are selected mutually, eg. microplastics, electric cars etc..

- Lab work for participants from secondary schools in college premises or filed trips Velenje where Environmental Protection College is located (Velenje is considered an ideal outdoor classroom – thermo power plant, mining, industry therefore area was degraded and polluted).

At the same time Environmental Protection College participates at local events organized by local or national authorities where different activities have been prepared for participants from primary and secondary schools (bring your toothpaste and we will check the amount of microplastic in it, bring your water sample and we will check its quality, bring the soil sample from your garden and we will suggest you if/what to grow …)

Why was the initiative launched?

Initiative launched in 2017, We got additional financial support from Ministry of Education at the beginning of 2021.

What are key achievements?

Promotion of studies in STE(A)M areas for professions of the future with quality activities and content for young people outside university centres (There are significantly fewer activities that would encourage young people to enrol in STE(A)M fields outside

university centres in Slovenia - Ljubljana, Maribor and Koper. This means that children from these backgrounds are in a deprived position).
What do you think were the key success factors?
Performed detailed analysis of the needs in secondary schools. Good cooperation with secondary schools. Good cooperation with partner HE institutions. Good cooperation with the municipality of cities Velenje and Celje.
What do you think were the barriers?
Funding (for summer schools). It is difficult to involve schools from more distant areas. During Covid pandemic the cooperation was limited to on-line events only.
If you were to start again, what would you do differently?
We would perform detailed analysis of the needs in secondary schools earlier.
National policies/programmes support the initiation/implementation/development of the initiative? If so, how?
Supported by the Ministry of Education.
Do you have plans to further develop the initiative? If so, what are they?
Additional activities planned in 2022 are: - Summer School for participants from secondary schools. - Training for teachers from secondary schools. - Expansion of offered filed trips, lectures etc.

TECHtalents (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	TECHtalents - Workshops for secondary school pupils
Website (if available)	www.aau.at/techtalents
Name of organisation implementing the initiative	University of Klagenfurt, Faculty of Technical Sciences
Year it started and ended/is expected to end	Since 2016, ongoing
Contact	Johanna Röttl
Short summary of the initiative	
The University of Klagenfurt offers technology workshops for high school pupils several times a year. The pupils have the opportunity to get to know the technical fields of study through a wide range of workshops.	

Why was the initiative launched?
The initiative was launched to make more high school pupils aware of the technical degree programmes offered at the University of Klagenfurt.
What are key achievements?
Two major successes are, on the one hand, that with this programme, we were able to inspire high school pupils to study technology at the University of Klagenfurt and that we were able to establish cooperation arrangements with companies, the province of Carinthia, the Austrian Chamber of Commerce, and other stakeholders and to use joint synergies.
What do you think were the key success factors?
The key success factors were and still are the good cooperation with stakeholders and their financial support. In addition, the programme was and is very well accepted by the schools in Carinthia.
What do you think were the barriers?
One challenge was to find suitable workshop formats for the different school levels. In addition, each person has different interests. Therefore, we tried to offer workshops covering all technical areas (e.g. mathematics, computer science, information technology) with different levels of difficulty.
If you were to start again, what would you do differently?
Nothing.
National policies/programmes support the initiation/implementation/development of the initiative? If so, how?
The programme was/is supported by the province of Carinthia, the Austrian Chamber of Commerce, and other stakeholders (e.g. KWF - Carinthian Economic Development Fund).
Do you have plans to further develop the initiative? If so, what are they?
The programme will definitely be continued. At present, there is no need to change the programme.
Any additional information
Find out more here: www.aau.at/techtalents

ADA – Algorithmen Denken Anders (Algorithms Think Differently) (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	ADA – *Algorithmen Denken Anders* (Algorithms Think Differently)
Website (if available)	www.ada.wien
Name of organisation implementing the initiative	Vienna Center for Logic and Algorithms, Vienna Univeristy of Technology (TU Wien)
Year it started and ended/is expected to end	2019 - 2021
Contact	office@vcla.at

Short summary of the initiative

Project ADA (Algorithmen Denken Anders – Algorithms Think Differently) is a 3-year educational outreach program of the Vienna Centre for Logic and Algorithms of the Vienna University of Technology (TU Wien). The project ADA's aim is to communicate scientific concepts, social implications and the strategic importance of algorithms, the building blocks of digitization, which in turn is of decisive importance for innovation, growth, employment and competitiveness. The project is named after Ada Lovelace (1815 – 1852), who is considered the first computer programmer, which is already an indication that one of the projects aims is to address the gender bias about the computer science in the general public.

The aim of the project is to enable pupils and young adults to acquire understanding of basic concepts of computer science with hand-on activities, what distinguishes it from the mathematics-focused computer science competitions. Not only in Austria, a flood of resources and initiatives deal in scattered and disjointed ways with the necessary promotion of the skills expected by industry and society 4.0. Although coding workshops for pupils contribute to skills development, they often fail to consider that important aspects of abstracted algorithmic thinking, creativity in programming, and reflection on the use of this technology and its application in the society.

Project ADA is built around four initiatives, all fostering creative computational thinking, which shapes all areas of digitalization that is crucial for innovation, growth, employment, and competitiveness. Those are:

A. The platform ADA.WIEN offers the largest collection of hand-on materials for computational thinking – CS Unplugged for the first time in its entirety in German language. The open-source materials are available for download. The online version of materials is accompanied with interactive games.
B. In the Hackathon for Good the pupils are required to combine learning or applying programming skills with critical thinking in the context of digitalization, in order to explore possible applications of artificial intelligence on progress towards SDGs (Sustainable Development Goals).
C. The workshop series Diary of a female computer scientist (Tagebuch der Informatikerin) allowed girls ages 11 – 17 face-to-face session with female computer scientists and IT experts in schools. Due to COVID-19 the workshop series pivoted in its virtual edition called SpeedMentoring, offered to pupils of both genders. Such workshops have shown to offer institutional support for societal transformation of gender roles in the field of STEM.
D. The world largest human sorting network, as a one-time promotional activity kicking -off the project in 2019 was performed by 50 pupils.

The project is run by the Vienna Center for Logic and Algorithms at the Faculty of Computer Science at the TU Wien. The project is funded by the Faculty of Informatics of the TU Wien (Vienna University of Technology), the Vienna Business Agency, and the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK).

Why was the initiative launched?

Due to the lack of similar initiatives in Austria, the VCLA developed project ADA to develop awareness about computational thinking and the impact of digitalization on the society. The activities of project ADA were developed aimed to raise

awareness about the digital skills of the changing innovation infrastructure and work environments, and to convey the importance of computational thinking while widening access to CS field to underrepresented groups of pupils.

COMPUTATIONAL THINKING

For some decades now – made public by the American computer scientist Jeanette Wing – it has been recognized that people who deal with computer science develop computational thinking. It is a kind of thinking that is algorithmic and process-oriented, in which abstraction and efficiency play a special role. Prof. Wing argues that computational thinking should be added to every child's analytical ability next to reading, writing, and arithmetic. The fact is that methods of decomposition, pattern recognition, abstraction and algorithms are integrated in scientific methods of every science.

Computational thinking can be learned and taught at all ages, from kindergarten to high school, and of course beyond. Computational thinking deepens the understanding of algorithms and logic in all fields of science, be it physics, chemistry, biology, astronomy, mathematics or be it the humanities.

One of the largest collections of materials on computer thinking is CS Unplugged (Computer Science Unplugged), which introduces computational thinking through stimulating games and tasks using cards, string, wax crayons, and lots of movement. CS Unplugged is freely accessible, but unfortunately in 2019 only 7 of the 22 chapters were available in German. Therefore, the project ADA aimed to make the complete collection available in German with illustrations, computer games, and videos with the assistance of the co-author, Prof. Michael Fellows (Uni. Bergen).

RESPONDING TO THE NEED IN THE COMMUNITY

Through the pilot activities on computational thinking the participation of pupils, students and teachers has shown that this there is a need on the side of the society to understand the basic concepts of computer science and the impact of the digitization on society.

Just recently in Austria, the lively public discussion on the planned use of algorithms by the State Unemployment Service (AMS) has shown how important it is that the general public has a basic understanding of algorithms.

The holistically designed three activities of the ADA project complement existing initiatives in Austria or create unique artifacts for impact. The project ADA recognises the key role that teachers and educators play in introducing children to the fundamental concepts of computer science.

In today´s society, to understand the basic concepts of computer science (i.e. what is an algorithm, what is data, what is algorithmic bias, what kind of application of artificial intelligence can be used for good) is to be literate. That does not mean that everyone has to learn how to programme. Project ADA has been widening the access to this knowledge, by collaborating with schools and parts of the society usually excluded, particularly girls and pupils whose access to the field is hindered by societal barriers, to enable active citizenship and contribution towards sustainable development.

What are key achievements?

All activities of project ADA, e specially CS Unplugged open source materials in a form of hands-on activities teach Computer Science through engaging games and puzzles that use cards, string, crayons, movement. The activities are designed to be used by the teachers without science background as well as the ones with it.

The project is not only widening access to the high-demand fields by using experimental learning, but it is also developing activities connecting digital skills with green skills (green skills are the knowledge, abilities, values and attitudes needed to live in, develop and support a sustainable and resource-efficient society (definition by UNIDO)).

The platform ADA.WIEN, becomes the first and so far only collection of all activities of CS Unplugged in German language (Open access), serving as the main source for activities on informatic thinking in the German-speaking region. This was made possible the cooperation with the ETH Zürich, Switzerland. The sustainability of the platform is safeguarded.

Project ADA has offered its open source and hands on materials on the Scientix platform, and has been represented by the Scientix Ambassador, Hermann Morgenbesser.

Project ADA's materials have been incorporated in the national bank of resources for teacher curated by the governmental network eEducation thus safeguarding the sustainability of results and impact.

The series of Hackathons for Good Artificial Intelligence #4GoodAI pose interdisciplinary challenges on the intersection of computer science and achieving Sustainable Development Goals (SDGs) to the pupils in Austria.

Project ADA initiated Week for Good Artificial Intelligence at the TU Wien, in the framework of the EU Code Week, offering virtual webinars and workshops on the topics of computational thinking, programming workshops, resources for teachers, and Hackathons. The activities open for the general public, pupils, students, parents and teachers.

20 Published videos of experts explaining basic concepts of computer science, innovation, artificial intelligence, CS Unplugged, team work, in German Language on YouTube

The workshop series Diary of a Female Computer Scientist) aimed at girls between 12 and 15 years of age, reached more than 300 girls across Austria. The workshop received its virtual twin in SpeedMentoring and extending its scope over female and male participants between 15 and 18 years of age, reaching 600 participants since 2020.

Organisation of the world largest human sorting network with 50 pupils based on the CS Unplugged.

What do you think were the key success factors?

Through the pilot activities on computational thinking the participation of pupils, students and teachers has shown that this there is a need on the side of the society to understand the basic concepts of computer science and the impact of the digitization on society.

Just recently in Austria, the lively public discussion on the planned use of algorithms by the State Unemployment Service (AMS) has shown how important it is that the general public has a basic understanding of algorithms.

The holistically designed three activities of the ADA project complement existing initiatives in Austria or create unique artifacts for impact. The project ADA recognises the key role that teachers and educators play in introducing children to the fundamental concepts of computer science.

What do you think were the barriers?

The decision to participate in the activities such as ADA is in the domain of individual teachers, who need to find time in their teaching programme. The main barrier for many of those is not enough school hours to be able to participate in such activities.

The interest in the project and demand for its activities surpassed the human resources available.

If you were to start again, what would you do differently?

Gain more funding earlier.

Did national policies/programmes support the initiation/implementation/development of the initiative? If so, how?

Bundesministerium für Bildung, Wissenschaft und Forschung Abteilung Präs/15 – IT-Didaktik: dissemination of information. -eEducation Austria: invitation to present at the conferences, offering booths. -Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMVIT now BMK) funding of the project.

Do you have plans to further develop the initiative? If so, what are they?

It is ongoing.

Any additional information

Links to the activities

- Project ADA: www.ada.wien
- CS Unplugged in German langauge: https://www.ada.wien/cs-unplugged-materialiensammlung/
- Hackathon for Good Artificial Intelligence: https://www.ada.wien/hackathon-4-good-ai/
- Tagebuch der Informatikerin / Diary of a Female Computer Scientist: https://www.ada.wien/tagebuch-der-informatikerin/
- World Largest Sorting Network: https://www.ada.wien/das-weltgroste-algorithmus/
- Week for Good Artificial Intelligence (Week #4GoodAI): https://www.ada.wien/woche-fuer-gute-kuenstliche-intelligenz-4-good-ai-tu-wien-eu-code-week-2020/

Selected Literature

J.M. Wing, “Computational Thinking,” CACM Viewpoint, March 2006, pp. 33-35, http://www.cs.cmu.edu/~wing/ • Model Checking, Temporal Logic, Binary Decisions Diagrams

Diary of a Female Computer Scientist (Tagebuch der Informatikerin) (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	Diary of a Female Computer Scientist (*Tagebuch der Informatikerin*)
Website (if available)	https://www.ada.wien/tagebuch-der-informatikerin/
Name of organisation implementing the initiative	TU Wien (Vienna University of Technology)
Year it started and ended/is expected to end	2019 – ongoing
Contact	office@vcla.at

Short summary of the initiative

The workshop series *Tagebuch der Informatikerin* (Diary of a Female Computer Scientist) is an initiative of the project ADA (*Algorithmen Denken Anders* – Algorithms Think Differently) run by the Vienna Center for Logic and Algorithms of the Vienna university of Technology (TU Wien). By participating in the workshops that take place in schools, girls ages 13-15 across Austria get the opportunity to a) gain an insight into the life and work of established female computer scientists and practitioners, b) reflect on their beliefs and possible stereotypes about women in computer science, c) reflect on own skills and career aspirations d) ask questions and establish personal connections. In the light of COVID-19 the workshop series pivoted to a virtual SpeedMentoring series open to boys and girls ages 11-17.

The aim of the workshop series is to address main barriers for school girls in Austria deterring them from entering the field of computer science: i) lack of female role models, ii) little or no practical experience with computer science, iii) and negative perception of the everyday reality of being a woman in science.

The barriers have been confirmed in the Austrian context based on the requirements gathering session called Hexagonal which was designed as a public peer-learning activity. One of the main lessons learned is that the beliefs the girls have about women in science in Austria are not necessary (most likely) equal to the ones hold by girls in Slovenia, or Germany, or Hungary. Something which was already indicated by the UNESCO report 'Cracking the Code'.

Because schools play a central role in determining girls' interest in STEM subjects, being on the intersection of the spheres of influence of parents, peers, media, and teachers while actually playing a role of vehicles for ensuring equal access to quality education.

The "*Tagebuch der Informatikerin*" takes place in cooperation with Informatik Austria, the Austrian Computer Society - OCG, e- Education Austria and EIS Education Innovation Studios of the Federal Ministry for Education (BMB) and the Future Learning Lab. It is an activity within the project ADA – *Algorithmen Denken Anders*, led by the Vienna Center for Logic and Algorithms at our faculty and funded by the Vienna Business Agency and the Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology (BMK).

Why was the initiative launched?

While in 2009/2010 in Austria 13.9 percent of computer science graduates were female, in 2017/18 the figure climbed to 14.9 percent. In 2018/2019 around the time when the project of Diary of a Female Computer Scientist was developed, that number was around 15 percent, under the European average of 17%.

Computer science and computational thinking provides learners with the knowledge, skills, attitudes and behaviours required to become active co-creators of the emerging digitalized society. Girls' under-representation in computer science and STEM in general puts a detrimental brake on progress towards algorithmic ethics, responsible artificial intelligence, and sustainable development.

BARRIERS – CONTEXT

Evidence, including the UNESCO Report Cracking the Code, shows that girls' self-efficacy and attitudes related to STEM are strongly influenced by their immediate family environment, especially parents, but also the wider social context.

Girls are held back by discrimination, biases, social norms and expectations that influence and the subjects they study.

The outcomes of the national stakeholder meeting Hexagonal confirmed that self-selection bias when girls and women choose not to pursue STEM studies or careers appears to play a key role, as girls often do not view STEM careers as consistent with their gender. Even if girls do not endorse these stereotypes themselves, knowing that people in their immediate environment hold such beliefs can undermine girls' confidence and thus their performance and intention to pursue STEM careers. The gender experts of the Austrian Computer Science Society have called out the parents and the media as the forgotten audiences when it comes to promoting girls in STEM. In addition, girls' confidence, motivation, and sense of belonging are influenced by the "peer climate." Girls need support to develop positive math and science identities, a belief in their abilities, and a sense of belonging in STEM studies and careers. This can be done by increasing girls' exposure to STEM experiences or making connections to role models. Opportunities for hands-on STEM experiences, including practical exercises, internships, career counseling, and mentoring, can broaden girls' understanding of STEM studies and careers and sustain interest, was confirmed by the practitioners with 20 years of experience in the youth work from MINT Salzburg.

Schools play a central role in determining girls' interest in STEM subjects, being the social nexuses where the gender beliefs and influence of parents, peers, media, and teachers play a role. Gender bias within schools and classrooms have been examined and confirmed, among others the World Bank, recognizing that when gender stereotypes are communicated directly or indirectly, through the design of school and classrooms, or through the behavior of faculty, staff, and peers, it goes on to have sustained impact on academic performance and choice of field of study, especially negatively affecting young women pursuing science, technology, engineering, and mathematics (STEM) disciplines.

The questions of gender equality reach into schools in many ways or are reflected in them, for example at the level of the different representation of the genders in the teaching profession, the different distribution of students in the respective types of schools or also in the form of gender differences in the various areas of competence (e.g. mathematics, reading). But in particular, everyday interaction is also shaped to a great extent by social gender, by social images of women and men, and by corresponding attributions and expectations.

As confirmed also by the UNESCO report Cracking the Code, such everyday representations of what does it mean to be a female computer scientist, or what does it mean to study computer science, is context specific.

The initiative Diary of a Female Computer Scientist developed the format of the workshop, the communication materials, and the mentoring handbook with activities to engage the pupils, on the basis of the context-specific barriers. The socially constructed bias informing the barriers for girls to decide to purse STEM courses, were determined on the basis of the analysis of the context-specific literature (Austria), and by gathering requirements in participatory workshop with community of practitioners in an public event called Hexagonal: *Tagebuch der Informatikerin*.

INTERVENTION DESIGN

The location of the workshop series was determined to be school, providing access to girls in the appropriate age range.

The workshops were led by the female computer scientists and IT experts, who gave the participants an insight in the life and work, and guide them through the activities designed to foster reflection about the stereotypes about women in computer science, ones skills, and provide basic career guidance.

The aim was to foster positive attitudes towards computer science, belief in their abilities and a sense of belonging in computer science studies and careers among the participating girls.

What are key achievements?

-Sustainability of the initiative is safeguarded by integration in the mentoring programme of the Faculty of Informatics of TU Wien, with necessary changes based on the available budget.

-Hexagonal in the Future Learning Lab of PH Wien as a public peer-learning event for community of stakeholders (practitioners) with representatives of Austrian entities working on projects to promote girls and STEM. The result of the meeting was the creation of a common digital platform that enables the coordination of activities across the Austrian provinces.

-Due to the sharing of research and lessons learned in the Austrian context among the stakeholders of Hexagonal the initiative Tagebuch der Informatikerin was able to target context specific barriers among girls in Austria in relation to computer science. Lesson learned i.e. the beliefs the girls have about women in science in Austria are not necessary equal to the ones hold by pupils in Slovenia, therefore more research in national and cross-national context is needed.

-Development of materials guiding the female mentors, providing them with examples of activities.

-Recruiting of female computer scientists and IT experts and schools in across Austria (i.e. face-to-face in 2020 reached directly 300 girls.

-Pivoting the format of the Tagebuch der Informatikerin to virtual under a new name, SpeedMentoring, matching of female computer scientists and female and male pupils allowed us to reach since 2020 virtual 600 girls and boys ages 15-17.

-The Workshops *Tagebuch der Informatikerin* took place also schools in Vienna which are commonly referred to as '*Brennenpunkschule'* (schools with pupils with disadvantages social background).

-Video interviews with female computer scientists, and practitioners in the field (CSOs, higher education institutions) are published platform ADA.Wien.

What do you think were the key success factors?

A) CONTEXT ANALYSIS

The initiative developed the format of the workshop, the communication materials, and the mentoring handbook with activities to engage the pupils, on the basis of the context-specific barriers. The socially constructed bias informing the barriers for girls to decide to purse STEM courses, were determined on the basis of the analysis of the context-specific literature (Austria), and by gathering requirements in participatory workshop with community of practitioners in an public event called Hexagonal: *Tagebuch der Informatikerin*.

B) DEVELOPING PARTNERSHIPS AND COMMUNITIES OF PRACTICE

-Share lessons learned in community of practice, especially through the requirements gathering event Hexagonal

-Establishing partnerships with multiplicators for distribution of information and invitations at the higher education institutions, in the national network of schools, and especially among teachers.

-Support on the institutional (TU Wien), and governmental level (Ministry)

C) DESIGN OF THE INTERVENTION

The format of the initiative and the topic of computer science filled the gap in Austria by: i) bringing the role models in the classrooms, enabling the teachers to actually implement such an activity in the class without additional workload ii) engaged mentors, i.e. female computer scientists

What do you think were the barriers?

A) RESEARCH

More research and especially longitudinal studies in the national context is needed to determine barriers for entry in STEM fields, especially computer science, and to determine the successes of early-age interventions such as mentioned activity.

B) COMMUNITY OF PRACTICE

A common community of practice would be desirable, as well as an Austria-wide platform where projects can be planned together and experiences can be exchanged, across province borders, and between university-HEIs-NGOs

C) SCHOOL TIME FRAME

School time – taking part in the activities depends on individual teachers, or individual schools. Integration of such activities in time and curricular planning would be necessary. For that the organizers of such activities would need to be connected with the schools or directly with the ministries, which could provide platforms where schools and organizers meet already during the planning process – co-creation.

Teachers who do innovations at their own schools share their experiences and meet at the eEducation Austria network. However, when the meetings and conferences for teacher's continuing education take place in another Austrian province, many teachers cannot attend the conference because I) the school plan and finance does not allow for such attendance. This has been an issue highlighted many times at various eEducation Austria events, and evidently could be improved.

D) FUNDING

Taking into account the demand for the workshops coming from urban and rural areas, additional funding would enable to reimburse the transport costs allowing mentors to reach schools on the country-side. COVID-19 allowed us to pivot the format to online workshops, which allowed us to reach schools in rural areas, however it exposed the issue of poor school infrastructure (poor internet, lack of computers)

If you were to start again, what would you do differently?

Longer preparation time to develop a roster of female computer scientists.

Seek formal support from the governmental bodies sooner.

Seek additional funding by inviting private sponsors and international donors.

Did national policies/programmes support the initiation/implementation/development of the initiative? If so, how?

The institutional polices of the Faculty of Informatics and the TU Wien, influenced by the national policies related to the responsibility of higher education institutions for the wider community reflected in the evaluations and funding agreements did foster the support for such an initiative. The activity was partially also funded by one of the ministries (BMVIT), as part of the project ADA – *Algorithen Denken Anders*.

However, when it comes to support in dissemination, on the national level, the lack of coordination between governmental bodies dealing with the topic of gender and education proves to be persistent barrier to efficiency.

Do you have plans to further develop the initiative? If so, what are they?

Integration in the university-wide mentoring programme, adding more human resources, and increasing the budget.

Any additional information

- Tagebuch der Informatikerin / Diary of a Female Computer Scientists: https://www.ada.wien/tagebuch-der-informatikerin/
- Hexagonal Requirement gathering and Stakeholder Peer-Learning round table: https://www.ada.wien/hexagonal-diskutiert-tagebuch-der-informatikerin-die-hauptbotschaft-an-die-madchen/
- Handbook for Mentors: SpeedMentoring (preparation): https://www.ada.wien/wp-content/uploads/2020/10/Handbuch-SpeedMentoring_MR.pdf

Selected literature:

UNESCO. 2019. Cracking the code: girls' and women's education in science, technology, engineering and mathematics (STEM). Available at: https://unesdoc.unesco.org/ark:/48223/pf0000253479

Gaisch, Martina and Berthold Kerschbaumer. 2019. Informatikausbildung: QUO VADIS? Impulse von (potentiellen) Informatikstudentinnen zur Erhöhung des Frauenanteils in der Informatik. Trauner Verlag Linz.

Informatics-Lab / Informatikwerkstatt (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	Informatics-Lab / Informatikwerkstatt
Website (if available)	https://www.aau.at/schuelerinnen-und-schueler/informatik-werkstatt/
Name of organisation implementing the initiative	University of Klagenfurt, Department of Informatics Didactics
Year it started and ended/is expected to end	Since 2014, ongoing
Contact	iid-office@aau.at

Short summary of the initiative

The Informatics-Lab is available to computer science and engineering enthusiasts and those who want to become one, with a diverse range of materials, changing thematic focuses and regular workshops to support instructional design, enable new ideas and experiences and encourage both children and adults to try out, marvel, explore and discover. Topics like modelling and diagrams, algorithms and programming, robotics, Boolean algebra, binary numbers, encryption, networks, or computer systems can be found in the various workshops and materials offered in the lab.

It is open several afternoons each month and can be visited by those interested. Weekly thematic focuses and thematic blocks are offered over several workshop dates. Individual appointments, topics and workshops are possible at any time by arrangement.

Why was the initiative launched?

The main aims are:

- Increase the interest in informatics, engineering and technology as early as possible.
- Consolidate student and teacher knowledge about informatics (concepts, usage, career, etc.).
- Foster general learning skills like text comprehension, problem solving, logical thinking or creativity.
- Develop and evaluate brain-friendly teaching materials.

What are key achievements?

With a playful, fun and "COOL" approach to technology and informatics that is implemented during early childhood the lab is able to raise the interest and to lay a good foundation for logical and computational thinking. It also mitigates fears or gender differences regarding interests and performance in technical subjects. An interdisciplinary and cross-curricular use of computer science concepts (NOT only computers) does not only offer more possibilities of practice for more sustainable learning, it also shows a wide range of application areas of computer science, fosters creativity as well as cross-linked thinking and supports teaching and learning in other subjects.

What do you think were the key success factors?

The topics of computer science and digital devices are very current and of great interest, but misconceptions often exist about them. Even more, these topics are rarely covered in kindergarten or primary and lower secondary schools in Austria. With gender-sensitive advertising and current, age-appropriate topics, we manage to appeal to many children and young people (and even adults). Also, the workshops are developed in a brain-friendly and COOL (short for Corporate Open Online Learning) way and, thus, make a lot of fun.

What do you think were the barriers?

As the Informatics-Lab is stationary, it is difficult to involve schools from more distant areas. During the pandemic, when schools did not allow external events, it was also not possible to visit the lab.

If you were to start again, what would you do differently?

- In the beginning, we only had units that were completed in one day. This makes it difficult to continuously build competencies. So, we would develop a modular workshop system quite from the beginning (which we have now), with the possibility to individually connect topics to an ongoing sequence of workshops.
- Add a mobile lab for schools for more distant areas.
- Parallel development of materials for workshops with presence and for distance learning. Add a remote or online lab from start on (in the Informatics-Lab we implemented online courses in 2020).
- We would use a long-term survey tool right from the beginning of the project. It wasn't until 2018 that we launched such a tool (KAUA, https://kaua.aau.at) which is General Data Protection Regulation (GDPR) compliant.

National policies/programmes support the initiation/implementation/development of the initiative? If so, how?

For the first five years of the project, it was funded by the Federal Ministry of Education, Science and Research in form of the Higher Education Area Structural Funds program. This mainly included personnel and equipment costs.

After the funding ended, the University of Klagenfurt and the Regional Center for Didactics in Computer Science (RFDZ - *Regionales Fachdidaktik Zentrum Informatik*) continued to maintain the Informatics-Lab.

Do you have plans to further develop the initiative? If so, what are they?

The plans include the expansion of the offered workshops and a focus on collaboration with other disciplines in an interdisciplinary and cross-curricular lab. Further a collaboration with additional stakeholders in the field of education is planned to reach even more students. Also, the online lab will be extended and additional material will be developed.

Any additional information

Since 2018 the KAUA platform is used for participant surveys. It provides the recognition of repeated participants without storing their personal data or even remembering a password.

Since 2020 some workshops are provided in an online format to overcome pandemic restrictions.

Starting in 2023, units developed as part of the DigiFit4All project (https://www.aau.at/en/informatics-didactics/research/projects/digifit4all) will also make their way into the Informatics-Lab.

A platform to provide information for prospective adult learners (Netherlands)

Key facts about the initiative	
Country	Netherlands
Name of the initiative (in English/in the local language)	www.universitairdoorleren.nl – A platform to provide information for prospective adult learners
Website (if available)	www.universitairdoorleren.nl
Name of organisation implementing the initiative	Universities of the Netherlands (UNL)
Year it started and ended/is expected to end	2021 (no end)
Contact	vanbarneveld-biesma@unl.nl

Short summary of the initiative

In November 2021 the universities of the Netherlands launched a website containing all online and offline courses for professionals. These courses range from post-graduate master degrees for professionals to one-week short courses. All fourteen of the Dutch public universities present their professional education courses through this website.

Why was the initiative launched?

Universities in the Netherlands noticed an increasing public interest in lifelong learning. Professionals seek an expansion of their skillset to adapt to the changing economy (broader multi-disciplinary skills, new technologies, etc.) in addition to the traditional use of lifelong learning for upskilling within a specific professional field, With the growing impact of innovations on

the economy and the pressure of societal challenges – from climate change to AI to health care to inequality – universities want to contribute to equip professionals with the necessary skills for these challenges. They have offered courses for professionals for many years, but did not have a 'one-stop-shop' for this prior to the website. The website supports professionals to easily identify courses that are relevant to their work. In addition, by providing all this information together, employers and government authorities are encouraged to increase their dialogue with the universities regarding the need for new types of lifelong learning opportunities.
What are key achievements?
The launch of the website was positively accepted by the greater public. The minister of Education welcomed the initiative alongside representatives of the private sector. Most importantly within a short time it reached a great amount of hits from the public.
What do you think were the key success factors?
Taking sufficient time (2 years) to jointly determine what courses can be considered lifelong learning and are relevant to professionals and to build the website jointly. Each university assigned 2 representatives; one for the technical side and one for the policy side so that the website could be designed around both the technical feasibility in the long run, as well as in line with the strategic vision around lifelong learning. Of course, also including professionals in the testing of the website.
What do you think were the barriers?
A lack of common definition of lifelong learning and the lack of a common ICT system and processes for registering and keeping track of lifelong learning courses.
If you were to start again, what would you do differently?
Include employers in the testing panel and taking more time on the communication of the website.
National policies/programmes support the initiation/implementation/development of the initiative? If so, how?
No. However, a government initiative was started in 2021 to also launch a national website containing all lifelong learning courses at all levels of education, public and private.
Do you have plans to further develop the initiative? If so, what are they?
Yes, in collaboration with employers we seek to ensure the search criteria are relevant to the challenges in the economy.

Studieren Probieren (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	Studieren Probieren
Website (if available)	www.studierenprobieren.at
Name of organisation implementing the initiative	Austrian Students' Union
Year it started and ended/is expected to end	Start: 2009
Contact	Magdalena Hangel magdalena.hangel@oeh.ac.at
Short summary of the initiative	
Studieren Probieren is a milestone on an individual's way to Higher Education. Through a few clicks on the program's website, an individual interested in studying gains access to a sneak peak in over 300 fields of study. But this isn't a simple field trip to a university: it's a guided event. A student will accompany a group of prospective students into a lecture and answer all of their question. These are not only limited to the field of study, but also about everything related to studying in this specific place: e.g.	

housing, work and how to meet other students. The participation to events in different fields of studies is highly recommended. Due to this we don't only provide information about studying but also about the choice one has to make. All of this and the fact that it is free helped to establish Studieren Probieren all over Austria, through all genders and backgrounds. We seek to take the fear away from young and older people, who have yet to make their first steps into academia. We aim to help them successfully navigate their studies and empower their decision to study in the first place. Last semester Studieren Probieren helped nearly 6000 prospective students.

Why was the initiative launched?

The Austrian National Union of Students has always been a guide for prospective students. Due to this the derivative of prospective students being scared of by their respect, lack of knowledge and even fear of Higher Education became more and more evident. At the same time the sheer number of fields of study and the implement of the Bologna system of study made universities even more complex. Studieren Probieren was launched 2009 with the goal to empower individuals into a start with the necessary resources to navigate and successfully finish their studies.

What are key achievements?

- Reaching prospective students before they enrol to university
- Helping prospective students to overcome structural and personal barriers to achieve access to Higher Education
- Empowerment for e.g. first generation students that would otherwise have no chance of getting a peak into authentic university life

What do you think were the key success factors?

Studieren Probieren is a program created, developed and tended to by students. Due to this, prospective students are able to get guidance (nearly) at eye level. Every guide working on Studieren Probieren knows the hardship of their field of study and thus can give authentic help. They are also young enough to actively remember their first steps into Higher Education, which gives the main target audience an easier possibility to connect.

What do you think were the barriers?

The first years of Studieren Probieren were dominated by a lack of a public profile. Teachers and other guidance counsellors were reluctant and careful at first, but through the great response of participants and the growth of the program we're proud to say that this has chance immensely.

If you were to start again, what would you do differently?

Put more focus on the online-channels as well as making the website more accessible (which, of course, is always connected to higher costs)

National policies/programmes support the initiation/implementation/development of the initiative? If so, how?

Studieren Probieren is funded by the Austrian Federal Ministry of Education, Science and Research. With an increasing public profile Studieren Probieren gained more and more supporters over time: individual institutions of Higher Education, stake holders in the field of guidance counselling, the Public Employment Service Austria, guidance counsellors at school and many more. Without their support the growth and quality of Studieren Probieren wouldn't have been possible.

Do you have plans to further develop the initiative? If so, what are they?

Our steady goal for Studieren Probieren is it's growth both in funding but also in public profile. We aim to empower more and more prospective students through a time of fast chances in the Higher Education Sector.

Our next major goal is to improve the quality of our program. We gather feedback from our participants on a regular basis and would like to launch even more possibilities to do so. We also wish to start a better train-the-trainer program for our guides, who are stationed all over Austria.

Studierplattform.at (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	Studierplattform.at
Website (if available)	Studierplattform.at
Name of organisation implementing the initiative	**Austrian Students' Union**
Year it started and ended/is expected to end	Start: 2012
Contact	Johannes Ruland Johannes.ruland@oeh.ac.at
Short summary of the initiative	
Studienplattform.at is a search engine for all degree programs in higher education in Austria. In addition to the basic information (curricula, ECTS, Links to respective websites...) studienplattform.at offers information on possible fields of work, different types of entrance examination (particularly for students with a non-linear transition), the application deadlines and the contact details of the respective student representatives. In addition, there is information on suitable events such as education fairs, open days and Studieren Probieren Events. The aim is to offer an as comprehensive one-stop store as possible for choosing a program.	
Why was the initiative launched?	
The aim is to support prospective students but also study counselors (i.e. in school or at the Student Union (ÖH) and offer verified information since there are a lot of changes in the field of higher education and a rising number of programs each year.	
What are key achievements?	
Offer a search engine from the students' perspective. Often Websites like this are run by Ministries or higher education Connect the prospective Students to the student representative	
What do you think were the key success factors?	
Time: It took a year to develop and test the concept of the website. Although it is now 10 years old, the basic structure still works. Practical expertise: The extensive knowledge from the daily business at the Student Union helped a lot to build the website.	
What do you think were the barriers?	
Man power. It takes a lot of time to keep the website up to date.	
If you were to start again, what would you do differently?	
Offer more video-content	
National policies/programmes support the initiation/implementation/development of the initiative? If so, how?	
There are plans to merge the databases between the Students Union and the Austrian Federal Ministry of Education, Science and Research	
Do you have plans to further develop the initiative? If so, what are they?	
Improve the search engine	

BeFirst! (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	BeFirst! For secondary school students
Website (if available)	https://www.aau.at/schuelerinnen-und-schueler/be-first/
Name of organisation implementing the initiative	University of Klagenfurt
Year it started and ended/is expected to end	2019 – open-ended
Contact	Aurora.Alonso@aau.at

Short summary of the initiative

BeFirst! is a mentoring programme for first-generation students from families without an academic background. It is a low-threshold offer aimed specifically at first-generation school pupils and students. Designed as a peer-to-peer mentoring programme, students act as mentors for school pupils in the final year of school (**orientation phase**) and the first year of studying (**introductory phase**).

Why was the initiative launched?

This peer-to-peer mentoring programme is geared towards helping prospective students to conquer fears, information deficits and prejudices. Many "non-academic children" choose not to study despite their talent and this programme aims to tackle this hurdle.

What are key achievements?

To encourage young people who have not previously considered studying to take up a degree programme. Low drop-out rates and a high level of exam activity.

What do you think were the key success factors?

Peer mentoring is an effective way to reach the target group. Broad support from partner schools and the university are elementary.

What do you think were the barriers?

The main obstacle is funding. Workshops for pupils and students should be expanded if possible

If you were to start again, what would you do differently?

We would focus primarily on vocational secondary schools and work with the younger pupils.

Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?

The programme is financed through the university's performance agreement funds.

Do you have plans to further develop the initiative? If so, what are they?

Yes, we would like to start to work with pupils in the year before the Matura (school-leaving examination) and recruit other schools in the outlying districts as cooperation partners. Expand our collaboration with youth organisations, advisory services.

Studienkompass (Germany)

Key facts about the initiative	
Country	Germany
Name of the initiative (in English/in the local language)	Studienkompass
Website (if available)	www.studienkompass.de www.sdw.org
Name of organisation implementing the initiative	Stiftung der Deutschen Wirtschaft (sdw)
Year it started and ended/is expected to end	2007 - ongoing
Contact	Dr. Ulrich Hinz, Head of Scholarship Programs for Pupils u.hinz@sdw.org Tel: 0049-30-27890671

Short summary of the initiative

Studienkompass is one of Germany's largest non-profit educational support programs. It was established in 2007 by Accenture-Stiftung, Deutsche Bank Stiftung and Stiftung der Deutschen Wirtschaft. Since then, numerous partners from the foundation sector and the German economy have joined the initiative.

More than 1,100 young people from non-academic family backgrounds are currently receiving support nationwide, and around 3,800 young people have already successfully completed the program. Around 150 volunteer mentors are currently involved in the program and support the young people throughout the program. We are the first student program to have developed its own app, which accompanies both the sponsored individuals and the volunteers through the sponsorship in a way that is tailored to the target group and provides a wealth of information about career orientation and the working world of the future.

Studienkompass supports the scholarship holders during the last two years in school and the first year of university or vocational training. During these three years, the students are accompanied by volunteer coaches and participate in numerous workshops and trainings that empower them to plan their future independently.

Why was the initiative launched?

Studienkompass was created to contribute to more equal opportunities in the education system. In Germany educational opportunities are closely tied to the socioeconomic background. The figures have hardly changed in the past years. The most recent study by Stifterverband für die Deutsche Wissenschaft from September 2021 shows that only 24 percent of all non-academic children go on to university. By contrast, 79 percent of the children of academics do so. The imbalance is also evident in vocational training. Children from non-academic and migrant families drop out of trainings disproportionately often.

Studienkompass ensures that the choice of educational and career path is not determined by socioeconomic background. It should be based on the interests, talents and potential of the individual. We are specifically targeting young people from non-academic families. It is often more difficult for them to find out about the full range of options available after graduating from high school. In order to find the right path for them, they have to overcome greater hurdles.

Young people from non-academic family backgrounds often lack sufficient confidence to pursue a university education despite their undeniable abilities, or they are uncertain about how to finance their studies. Therefore, young people with poor starting opportunities need specific support. At this point, Studienkompass would like to make a contribution to more equal opportunities in the education system. The program focuses on those who experience early disadvantages and need special guidance in their career planning.

Our target group often perceives studying as a risk, since later career fields are not always clearly defined and financing studies is seen as a major burden. Added to this is a lack of confidence in their own abilities. Many find it difficult to find a good answer to the questions: Is an apprenticeship or a course of study a better fit for me and will I be able to cope with the challenges involved? This is where Studienkompass comes in and is aimed specifically at young people who are thinking about being the first in their family to go to university.

What are key achievements?

Studienkompass offers students the opportunity to discover their own talents and to make a decision about their own professional future based on a stable foundation. The external evaluation shows, that the participants feel significantly strengthened and more self-confident as a result of the support. Due to their good preparation Studienkompass participants

drop out of university significantly less often. The nationwide dropout rate in Germany is 28 % while the dropout rate of Studienkompass participants is 5% (both Bachelor-Degree).

In addition, we have succeeded in constantly expanding our range of offers during the years and making it more contemporary. These include many digital courses, the Studienkompass-App, and thematic focuses such as start-up topics, STEM subjects, and cultural education.

We have also been able to further improve our selection process in order to reach precisely the target group that can benefit most from the support.

Studienkompass has also helped to raise awareness for social inequality in higher education access. The importance of study and career guidance has also been increasingly recognized in recent years. Studienkompass has succeeded in bringing its own experiences and methods into schools, so that even more students can benefit from them.

What do you think were the key success factors?

One key success factor is the continuous support over three years. Studienkompass participants are thus not only accompanied continuously and intensively. They also receive support during the transition to the next stage of their education at college or in vocational training. When developing our services, we always look at the needs of young people. Their continuous feedback helps us to become better. Besides we can build on a broad network. This includes, for example, teachers, schools or educational administrations and, of course, sponsors who have accompanied us for many years. In addition, a committed team and many great volunteers.

What do you think were the barriers?

Individual support is cost-intensive. We are always in need of finding new sponsors to continue to offer the program on a large scale. Individual support also runs from personal exchange. For many supporters, the focus is currently on scaling projects as much as possible. However, we are convinced that the approach of individual support is a worthwhile one that should not be neglected. In times of pandemic, we had to invest a lot of effort in replacing training with digital offers. It was also more difficult to reach potential applicants, because schools were busy with many other issues and had little time for offerings beyond the curriculum.

If you were to start again, what would you do differently?

Our experience has shown that the target group of non-academic youth is very diverse. Over the years, we have been able to steadily improve our selection process. The criteria that we now use should have been given greater consideration from the beginning. This includes growing up in social risk situations: poverty, unemployment, parents' educational level, family language and other special family conditions.

Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?

Based on the experiences and the methods of Studienkompass the German Federal Employment Agency and the state education ministers started a major multi-year project with us, which we will present to you in more detail on the following pages.In addition, the Federal Ministry of Education and Research made it possible to conduct a scientific evaluation of the program's effectiveness over several years and financed the Elternkompass, an advisory service on scholarships and student funding that emerged from the Studienkompass, for the first few years.

Do you have plans to further develop the initiative? If so, what are they?

We are constantly developing our program to offer the best preparation for the future. With digital offers and our app, we also want to expand the teaching of future skills. We also still like to improve our selection process to reach exactly those young people who need the most support.

Any additional information

Take a look at our app: https://app.studienkompass.de/

Effective support for career guidance (Germany)

Key facts about the initiative	
Country	Germany
Name of the initiative (in English/in the local language)	Effective support for career guidance / *Berufliche Orientierung wirksam begleiten*
Website (if available)	www.sdw.org/studien-und-berufsorientierung-wirksam-begleiten
Name of organisation implementing the initiative	Cooperation between the German Federal Employment Agency and Stiftung der Deutschen Wirtschaft (sdw)
Year it started and ended/is expected to end	2017-2021
Contact	Nandita Wegehaupt, Head of Strategic Partnerships n.wegehaupt@sdw.org Tel: 0049-30-2789061561

Short summary of the initiative

On behalf of the German Federal Employment Agency (Bundesagentur für Arbeit), the Stiftung der Deutschen Wirtschaft (sdw) implemented the nationwide project "Effective support for career guidance" from 2017 to 2021. The aim was for career counselors at employment agencies and teachers at upper secondary schools to perceive study and career guidance even more strongly as a joint task and to shape it effectively in mutual coordination. This will make an important contribution to improving the career guidance programs offered in the upper grades of grammar schools. The project was implemented in 14 German states with the support of the State Ministries of Education and the regional offices of the Federal Employment Agency.

Within the project, sdw further developed experiences and concepts that it has successfully tested in the Studienkompass program for first generation students since 2007. sdw has already implemented the concepts for Bavaria in a model project in cooperation with the Bavarian Industry Association (vbw – Vereinigung der Bayerischen Wirtschaft e. V.) and the Bavarian State Ministry for Education from 2013 to 2015. The book created in this framework served as the basis for the elaborations for the individual states.

A total of 14 books with teaching materials have been produced. In addition, more than 4.000 teachers and career consultants nationwide were trained in the use of the materials. In the course of the Corona pandemic, in 2020/2021 all units were also adapted for digital use and distance learning.

Why was the initiative launched?

The Federal Employment Agency is the main player in career orientation in Germany and is represented at schools with a wide range of different offers and information services. Due to the growing number of young people taking the general higher education entrance qualification (Abitur), the Federal Employment Agency has also stepped up its efforts to provide career guidance at high schools in recent years. The aim is to provide more support for young people so that they can find a suitable course of study or career training and also reduce the high number of dropouts.

The federal agency also wanted to strengthen the cooperation between its career consultants and teachers. With its materials and experience, sdw was able to combine goals and provide support along the way.

What are key achievements?

Career orientation is a topic that affects all young people. With the project, we were able to contribute to giving more young people the chance to deal with their own future in school - in detail and at an early stage.

Extensive manuals of teaching materials were developed in 15 states to address individual needs. The materials were developed in a comprehensive process with many different stakeholders - including ministries, schools, universities, business representatives and trade unions. Bringing together the various interests and working together to develop the handbooks for schools was a great success.

What do you think were the key success factors?

The materials are designed in such a way that they not only appeal to the target group, but can also be used quickly in the classroom - in various subjects. Due to the adaptations to the individual federal states, many special features could be taken into account. Through the involvement of the numerous stakeholders, the acceptance of the project and its results could be significantly increased. Concrete examples also help to directly link the work of teachers and career counselors. During the training sessions, the stakeholders have already worked together and have been able to develop ideas for their schools.

What do you think were the barriers?

In a federally structured country, the concrete implementation of career orientation varies greatly and the number of offers is very large. We have taken on a networking role to bring together different interests and offerings. That was a lot of effort, but it was worth it.

If you were to start again, what would you do differently?

In retrospect, we would think about digital implementation in all teaching units from the very beginning and align the training courses more closely with the digital skills of the teachers, because digitization offers so many new opportunities in the field of professional orientation.

We would try to include more time and space for the training sessions themselves, because there was often so much need for consultation that one day was not enough.

Did national policies/programmes/support the initiation/implementation/development of the initiative? If so, how?

The project was funded by the German Federal Employment Agency and 14 State Ministries of Education.

Do you have plans to further develop the initiative? If so, what are they?

The subject is still of high topicality, we will continue to advocate for a good career orientation for all students. and share our experience and methods. We are available for adaptations to other target groups and trainings.

Any additional information

More about our cooperation with the German Federal Employment Agency: www.sdw.org/studien-und-berufsorientierung-wirksam-begleiten

Final report of the project:
https://www.sdw.org/fileadmin/website/Downloads/TransferLab/Abschlussbrosch%C3%BCre_Berufliche_Orientierung_wirksam_begleiten.pdf

Student Success Office at New York University and their use of nudging (United States)

Key facts about the initiative	
Country	United States
Name of the initiative (in English/in the local language)	New York University, Student Success Office and their use of nudging through text messages to raise take-up of student support
Website (if available)	https://www.nyu.edu/students/student-success.html
Name of organisation implementing the initiative	New York University
Year it started and ended/is expected to end	2019
Contact	Jb6477@nyu.edu

Short summary of the initiative

The Office of Student Success at New York University, which supports the holistic education of all undergraduate and graduate students at our large, global university, is utilizing text message technology to communicate with all undergraduate students enrolled at the New York campuses. The goals of this text message initiative are four-fold: (1) **better engage students in a time of remote learning,** (2) **create a greater sense of community,** (3) **offer individualized and timely support and promote sense that someone at NYU cares about their well-being** (4) **communicate key information to students such as promoting NYU resources and events, providing academic tips, offering positive encouragement, and promoting self-care**.

This initiative gives timely support and guidance to help them navigate hurdles they may be facing, improve their experience and foster a deeper connection to the university, and thereby increase our overall persistence, retention, and graduation rates. Communication in this method allows for targeted and real-time, two-way communication between students and Student Success Specialists. Specialists can offer students immediate support and guidance in a time when students are facing additional challenges because of the COVID-19 pandemic. Benefits of utilizing text message technology include: texting being students' preferred method of communication, highly personalizable, allow for timely communication, low cost, easily scalable, and can be used to give timely reminders and simplify complex tasks.

Why was the initiative launched?

[Insert here]The initiative was initially launched to support students in high enrolment but relatively challenging science coursework. However with the COVID-19 pandemic, we expanded the program to include large portions of our undergraduate student population.

What are key achievements?

[Insert here]In the past 2+ years, we have sent over half a million text messages to nearly 30,000 undergraduate students. Our survey results prove this initiative was highly successful in supporting and engaging students. 94% of first year students said these text messages made them feel like someone at NYU cared about their success. 96% of first year students said the texts made them more informed about NYU resources. 95% of first year & STEM students said text messaging was an effective form of communication during remote learning. 88% of responses from our office were in less than 6 hours. 59% in less than 2 hours. Less than 2% of all students opted out of this program.

What do you think were the key success factors?

Key factors included institutional support, communicating the goals of this initiative across the campus, partnering with other offices and a deeply engaged team that was willing to put the time, effort, and intention in to making this initiative a success.

What do you think were the barriers?
The largest barrier was data management. NYU has over 27,000 active undergraduate students and nearly 7,000 new students each year. Managing this large of a data set, with correct contact information and student phone numbers, proved to be a significant challenge for our small team.
If you were to start again, what would you do differently?
Data management proved to be the biggest challenge. Given the ability to start this program over again, we would work out a clearer plan for managing the data of over 27,000 active students in a text messaging platform.
Do you have plans to further develop the initiative? If so, what are they?
We plan to continue this initiative for the foreseeable future and continue to use it as a method of communication with out students. We will also use it for campaign based targeted messaging around a specific topic of theme.

"Soft skills for life" programme (Portugal)

Key facts about the initiative	
Country	Portugal
Name of the initiative (in English/in the local language)	"Soft skills for life" programme at the University of Algarve to reduce dropouts in the 1st year
Website (if available)	https://www.ualg.pt/competencias-para-vida
Name of organisation implementing the initiative	University of Algarve
Year it started and ended/is expected to end	Start in 2018
Contact	snjesus@ualg.pt
Short summary of the initiative	
The soft skills for life program is a course that seeks to develop soft skills. It is a set of 12 modules, each one related to a competence considered important to be developed in a university student. The competences are distributed in a three-year program, with four competences being developed each year. The skills learned by 1st year students focus more on study methods and time management, while the skills developed by 3rd year students focus more on employability and transition to the job market. The program is done online, with asynchronous sessions consisting of videos that seek to teach participants to develop skills, with exercises that they must apply and practice on a daily basis. Each module must be completed over a period of one week. Some variables are evaluated at the beginning and at the end of the application of the program, as well as the follow-up, which allows to verify the advantages for the participants.	
Why was the initiative launched?	
Because it is increasingly important that higher education students develop transversal skills, in addition to the specific learning of the graduation they attend. These skills are increasingly valued by employers. However, this program seeks to develop personal and social development skills, important for the present and future global life of students, and not just skills important for professional activity.	
What are key achievements?	
. Developing soft skills for life (i.e., cognitive, socio-emotional and technical skills). . Decreasing academic dropout. . Increasing social integration and academic success of the students.	

. Promoting continuous soft skills' learning.
What do you think were the key success factors?
The program will be carried out online and asynchronously, allowing all students to participate, as they can adapt the course to their availability. Participation in the program appears in the students' diploma supplement when they complete their degree.
What do you think were the barriers?
The completion of the programme is not mandatory. Some professors do not value students' participation in this program, demanding that they dedicate themselves exclusively to the specific course in which they are enrolled at the university.
If you were to start again, what would you do differently?
Participation in this program should be mandatory for all students at the University of Algarve.
Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?
No, although educational policy increasingly values the development of soft skills by students.
Do you have plans to further develop the initiative? If so, what are they?
Make the participation of all students at the University of Algarve in the soft skills for life program mandatory. Make this course a Curricular Unit and assign ECTS to students who attend it. Allow the application of the program in other Higher Education Institutions.

Soft Skills Lab (Portugal)

Key facts about the initiative	
Country	Portugal
Name of the initiative (in English/in the local language)	Soft Skills Lab
Website (if available)	
Name of organisation implementing the initiative	ISCTE Portugal
Year it started and ended/is expected to end	Since 2009, ongoing
Contact	Rosario mauritti@iscte-iul.pt
Short summary of the initiative	
Iscte Soft Skills Lab is a decentralised organic unit, whose mission is the organisation and management of teaching and training activities in the area of transversal competences, languages and pedagogical innovation.	
Why was the initiative launched?	
1st phase (2009/): To promote study support skills, language teaching and technology skills enabling academic success, as well as skills to integrate the labour market; 2nd phase (since 2019): In addition to these activities, Iscte Soft Skill Lab organised specially tailored courses to support the application of non-traditional students to 1st cycle courses such as the Over 23s and students from vocational pathways; in addition it has developed a training offer especially suited to enable the inclusion and academic progress of students from African Portuguese Speaking Languages (European Portuguese; academic writing, digital literacy, living in a different culture, etc.).	

What are key achievements?
Improving academic success; creating an interdisciplinary environment; anticipating a culture of association between study and work activities; promoting relationships with students and professionals outside academia; developing functional and social intelligence; diversifying the body of students entering on our University.
What do you think were the key success factors?
1st phase: The agreement of the rectoral team to initiate the process; 2nd phase: Delegation of competences by the Dean for the organisation, with autonomy, of a particularly adequate formative offer, taking into account the various objectives stated; Involvement of key colleagues from the various department schools; Having a theoretical frame of reference on the challenges of education & training between the Academia and labour market; an organisation that ensures the coordination of a professional, interdisciplinary teaching staff, well integrated in the Iscte Soft Skill Lab mission, objectives and in teamwork; The interdisciplinary environment through the relation between students from different courses in classes; the teaching dynamics based on practical activities.
What do you think were the barriers?
Public sub-funding of new initiatives even when they are crucial to the government's education targets; Prejudices of some career teachers about the importance of soft skills; Turnover of teaching staff specially contracted for these activities; The LCT technical staff has only 5 permanent people; Difficulty in articulating timetables of different courses to ensure an interdisciplinary environment in the classroom; ensure that programmes are kept under review in the light of student assessment and employability challenges.
If you were to start again, what would you do differently?
To have an accounting cost centre allocated to the Iscte Soft Skill Lab with its own budget; To have a more flexible management that would allow us for the extension of activities requested by external organizations; It would be important to ensure some stability of teacher staff; improving a capacity building with Higher Education Institutions from African Countries.
Do you have plans to further develop the initiative? If so, what are they?
In this phase we intend to solidify the activities we have, consolidating the teacher staff to move forward in projects that articulate the labour market with the Soft Skills Lab; if possible, improving a capacity building with Higher Education Institutions from African Countries (at the moment we have 300 students from African Countries).

Excellence in Engineering Education, University of Aveiro (Portugal)

Key facts about the initiative	
Country	Portugal
Name of the initiative (in English/in the local language)	Excellence in Engineering Education at University of Aveiro (Excelência no Ensino de Engenharia na Universidade de Aveiro)
Website (if available)	http://see.web.ua.pt/index.php/excelencia-no-ensino-de-engenharia-na-ua/ (Portuguese and English summaries)
Name of organisation implementing the initiative	University of Aveiro
Year it started and ended/is expected to end	January 2017 – July 2020. Next phase being analysed
Contact	barbara.gabriel@ua.pt
Short summary of the initiative	
The "Excellence in Engineering Education at University of Aveiro" (E3@UA) has 3 main goals:	

1) Define the profile of the Higher Education Teacher of Engineering to better prepare students of Engineering for the labour market and, more important, for Society.

2) Develop a methodology to engage all the stakeholders of engineering education in defining the profile of the Higher Education Teacher of Engineering to prepare future engineers for the labour market and, most important, for Society in general.

3) Develop a tool that allows the study and analysis of the (mis)alignment between different target-groups regarding the defined profile of the Higher Education Teachers of Engineering.

Why was the initiative launched?

E3@UA born from the identified need to decrease the dropout in engineering courses, in particular, in the 1st year. It was considered a comprehensive approach and initiative involving the stakeholders in an urgent topic, being the catalysts:
1) Project F.I.C.A. of the Univ. Of Aveiro developing Tools for Identifying and Combating Dropout

2) Portuguese National Forum of Engineering Education which major outcome was the Higher Education Teacher as the key-element for improvement and change in Higher Education through quality teaching and capitalizing students' potential

3) Several reports reinforcing the quality of teaching as relevant for the success of the academic journey in HEIs, as OECD, UBF, EC, EUA, Portugal 2020, HEInnovate.]

What are key achievements?

The key achievements can be summarised as follows:

1) Awareness about the relevance of engineering education for the success in engineering courses

2) Discussion and definition of the profile of the Higher Education Teacher of Engineering

3) Development of a model for the effective engagement of all stakeholders in engineering education

4) Development of a tool, HEAT – Higher Education Assessment Tool - to analyse the (mis)alignment between different stakeholders about the profile of Engineering Higher Education Teachers.

What do you think were the key success factors?

1)Engagement of the community to be part of all the process, from the definition of the profile of the Higher Education Teacher to assessment of the relevant features: Top-management of the HEI, Deans of the Engineering Faculties, Teachers of Engineering, Students, Industry and business sector (later stage)

2) Clear communication of the objective of the initiative

3) Balance between top-down and bottom-up approaches to achieve the goals of the initiative.

What do you think were the barriers?

The barriers were related to the following topics:

1) Some resistance regarding (engineering) education topic relevance.

2) Communication channel used to engage the broader audience of students, particularly with students of the 1st year since they didn't use the institutional personal email address very often.

If you were to start again, what would you do differently?

1) Involve Alumni since the beginning of the process.

2) Change and optimize the communication channels to contact with students, particularly of the 1st year. It was evidenced that students of the 1st year use more often personal email addresses rather the institutional email address attributed when started studying at the university.

3) Engage business/industrial sectors and other stakeholders of society in an earlier stage of the initiative.

Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?

No. The initiative, that had no funding, was totally supported by the Rectory of the University of Aveiro.

Do you have plans to further develop the initiative? If so, what are they?
Yes. The plan to be implemented in the near future is to invite more business/industries to fill the questionnaire as well the society in general (Alumni, Engineers Association, public organisations that have engineer collaborators, citizens) and understand the (mis)alignment between the different target-groups.
Any additional information
The developed HEAT model is being used in a National Portuguese project focused in Engineering Education to analyse the (mis)alignment between distinct target-groups of stakeholders related to the engineering curricula that will be built within the scope of the project, aligned with the Education Area 2025. A master dissertation was developed inserted in project E3@UA. Available in link: https://ria.ua.pt/handle/10773/31315 . Summary of the dissertation available in English language. Dissertation written in Portuguese language.

Open Day - Doctoral Student Association (Hungary)

Key facts about the initiative	
Country	Hungary
Name of the initiative (in English/in the local language)	Open Day
Website (if available)	Phdpecs.hu
Name of organisation implementing the initiative	Doctoral Student Association
Year it started and ended/is expected to end	2020-
Contact	Phdpecs.hu
Short summary of the initiative	
The main goal of our initiative is to help to promote our PhD programmes and to give an opportunity to all of our doctoral schools to present themselves to prospective students.	
Why was the initiative launched?	
We found that many of the students have very little information about the PhD programmes and even less when it comes to individual doctoral schools, which had/has a serious influence on the number of students we can enroll each year.	
What are key achievements?	
Outperforming all of our expectations we were able to reach out to hundreds of interested students from all over the country.	
What do you think were the key success factors?	
Giving direct information and doing it online – without the need to travel it is much more easy fo the students to join in, regardless where they live.	
What do you think were the barriers?	
Properly market the event.	
If you were to start again, what would you do differently?	
I would put in more effort to make sure that the news of this event will reach as many students as possible.	
Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?	
No.	
Do you have plans to further develop the initiative? If so, what are they?	
We are planning to do a similar event for international students also in the future.	

References

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120 participants registered from 21 countries: Albania, Argentina, Austria, Belgium, Canada, France, Germany, Hungary, India, Ireland, Italy, Kyrgyzstan, Lithuania, Netherlands, Poland, Portugal, Romania, Slovenia, the United Kingdom and the United States. The aim of the seminar was to create room for exchange and peer learning, and – with this seminar brochure – a resource for policy makers and practitioners to support new and further develop existing initiatives that have the potential to widen access to higher education, guide learners in their choices, and support study success, particularly during the first year.

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