



EU STEM COALITION

STEM SKILLS FOR A FUTURE- PROOF EUROPE

Fostering Innovation, Growth and Jobs by
bridging the EU STEM Skills Mismatch

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FOREWORD

Knowledge and skills related to science, technology, engineering and maths (STEM) are crucial in responding to the challenges we are facing as a society. Developments in these fields underpin advances in scientific research across all disciplines and drive innovation and job creation across much of our economy. From 2003 to 2013, the number of people working in occupations related to STEM grew by 12%, three times faster than total employment in the EU. Occupations in these fields now account for 7% of all jobs and demand for skills linked to these disciplines is anticipated to increase, particularly in the area of information and communications technology (ICT).

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However, although many pockets of excellence exist, Europe as a whole is not keeping pace with demand for STEM skills. Employers in many regions of the EU report difficulties in finding people with the right skills, particularly ICT professionals, or, conversely, that graduates from STEM fields lack the problem-solving and communication skills necessary in modern business environments. While the number of people choosing to study STEM subjects in higher education continues to rise, patterns vary across the Union. These subjects are still often seen as “difficult” or unappealing, and a significant number of STEM graduates choose to work in other areas after they graduate.

Addressing these problems requires action on different levels. We need to kindle children’s interest in maths and science at school. We need to ensure STEM subjects in higher education equip students with a broad range of competences, including important transversal skills such as creativity, flexibility and an entrepreneurial mindset. And we need to build alliances between educators, employers, government and other partners to reach a common understanding of the skills required and how to help people acquire them.

This is precisely what we are working on at European level. By supporting innovative partnerships between schools, universities, employers and social entrepreneurs through the Erasmus+ programme. By bringing educators and businesses together through the University-Business Forum to promote better understanding of workplace needs and curriculum design. And by promoting the exchange of effective practice between governments and education providers. The European Commission recently completed a public consultation on the needs for an undated Modernisation of Higher Education Agenda. Early indications show that students, teachers and employers want more choice and better quality STEM subjects in higher education – we will continue to support policies encouraging provision of the best possible STEM education for our young people.

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The EU STEM Coalition – launched in October 2015 – is helping to develop and implement national strategies to promote these disciplines across Europe. It is a vital part of our efforts to improve STEM education in schools, and I am pleased to present to you this brochure which will give you an overview about its objectives and approach.

Tibor Navracsics

EUROPEAN COMMISSIONER FOR EDUCATION, CULTURE, YOUTH AND SPORT

EU STEM COALITION

To ensure smart, sustainable and inclusive economic growth and quality jobs for young people, there is a strong need for more Science, Technology, Engineering and Mathematics (STEM) graduates in Europe. The EU STEM Coalition aims to boost innovation-driven growth by creating momentum for the development and implementation of national STEM strategies in EU member states.

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To foster its industrial competitiveness and address future challenges such as climate change, energy supply, healthy aging and digitalisation, Europe will need to invest in a labour market which will meet the demands of innovation for growth in the current knowledge-driven economy. To reach these objectives the labour market's demand for STEM talent continues to rise. Whilst the existing STEM qualified population is ageing and retiring, Europe is confronted with significant youth unemployment, in some member states as high as 50%. The imminent need for STEM competences, combined with the fact that unemployment is more than three times lower amongst STEM graduates and that STEM degrees have the highest added economic value of a person's

personal income in later life, underlines the importance of focusing on STEM.

In many EU member state, due to demographic developments there are fewer young people. This makes it even more important that the proportion of young people with STEM competences should increase to meet the various challenges facing us. At the same time there is high number of vacancies for STEM jobs as well as high youth unemployment. This clearly shows there is a growing skills mismatch.

Two main challenges therefore are (1) to ensure sufficient talent inflow at all levels of STEM education and into the labour market and (2) to address this 'skills mismatch' between the skills school-leavers have and the evolving labour market needs.

Start of the EU STEM Coalition

In order to tackle the skills mismatch and to live up to the demand for STEM competences to meet the needs for innovation and economic welfare, several EU member states have successfully addressed this challenge by elaborating national STEM strategies. National STEM strategies are mostly carried out by national STEM platforms; so called 'triple helix'

organisations that promote a wide variety of innovative education and training practices based on the close cooperation between the ‘triple helix’ of business, education and government.

Well aware of the positive effect of a national STEM strategy and the benefits of an international exchange of ideas, the national STEM platforms of Denmark, the Netherlands, Estonia and Belgium have joined forces in the EU STEM Coalition. The EU STEM Coalition aims to address the need for innovation, growth and jobs, and to boost economic competitiveness through technological innovation, by creating momentum for the development and implementation of national STEM strategies in EU member states.

Objectives

The EU STEM Coalition focuses on the development and improvement of national STEM strategies, and in doing so increases the reach and impact of STEM related activities on the national level, through the active exchange of best practices between the existing national STEM platforms and by supporting the establishment of new national STEM platforms through targeted taskforce meetings.

The global objective of this project is to transform existing bilateral relationships into an effective Europe-wide network equipped to exchange knowledge and experiences at European level and to meet the rapidly growing demand for support by other member states. The EU STEM Coalition advocates for enhanced STEM competences by showing results and thereby raising awareness for the importance of focus on stronger development of STEM competences for the future wellbeing and international competitiveness of Europe. The EU STEM Coalition focuses to reach three main goals:

1. Boost the effectiveness of the national STEM platforms by shortening and intensifying the learning curve by good practice sharing and peer-to-peer coaching;
2. Support the establishment of new national STEM platforms in the EU member states by offering taskforce meetings to local teams;
3. Make all relevant outcomes available for stakeholders in- and outside the EU STEM Coalition network.

A bottom-up approach

Formulating a national STEM strategy fitting to each member state's need and subsequently building a national STEM platform is first and foremost a 'bottom-up' process. Its bottom-up nature inherently means that there is no 'one-size-fits-all' model or blueprint for a national STEM strategy and platform. Addressing national needs and preferences are prerequisite for a successful national platform. This can be illustrated by the differences between the STEM platforms currently participating in the EU STEM Coalition, each taking into account the specific economic, cultural and political context on the local, regional and national level. One element that has been proven effective in all member states with a national STEM platform, is the triple helix approach. This involves close collaboration between government, educational institutes and the industry. The main benefit of directly involving industry in the shaping and delivery of STEM education is that it results in a more relevant and up-to-date curriculum geared towards the current and future labour market needs. This reduces the need to (re)train recent graduates on the job (skills mismatch) and results in a better skilled pool of candidates that can find meaningful

employment. The direct involvement of business in vocational training and education also greatly increases the students' enthusiasm for STEM professions resulting in a higher inflow in STEM education programmes. Triple helix cooperation is often operationalised on a regional or even local level, and often includes other relevant parties (e.g. parents and youth organisations) in addition to the traditional triple helix partners.

New members

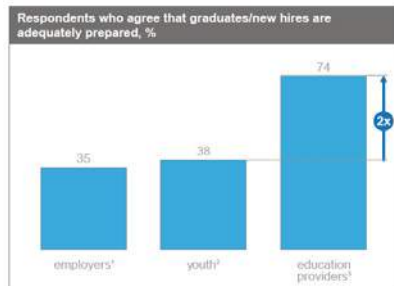
The EU STEM Coalition consists of three types of members – national platform members, supporting members and candidate members – and is open to new partners that underline the importance of STEM for the future of Europe and are aiming to address the STEM skills mismatch on a regional, national or European level. National STEM platforms and relevant pan-european organisations are welcome to contact the EU STEM Coalition about their possible participation. Member states or regions that are aiming to formulate a national STEM strategy or are in the process of establishing a national STEM platform and look for input of experienced partners, can request the EU STEM Coalition for support.

Becoming a candidate member of the Coalition, they can benefit greatly from exchanging knowledge and practices with more experienced platforms and by getting support through targeted taskforce meetings.

The main purpose of the taskforce meetings is to speed up the establishment of new national STEM platforms by providing peer-to-peer coaching. Based on the needs and interests of the requesting member state the taskforce is formed by a mix of members of the EU STEM Coalition; both national platform partners and supporting partners join the taskforce on a rotating basis, depending on the needs of the requesting party. New members will be able to ‘mix-and-match’ the practices that have been successful elsewhere, and tailoring the concept depending on requirements of their national context.

For questions, inquiries and requests; please contact the EU STEM Coalition team via info@stemcoalition.eu or visit www.stemcoalition.eu for more information.

Providers are twice as likely as employers and youth to rate youth as prepared



¹ Overall, the entry-level employees we hired in the past year have been adequately prepared by their prehire education and/or
² Overall, I think I was adequately prepared for an entry-level position in my chosen career field.
³ Overall, graduates from my institution are adequately prepared for entry-level positions in their chosen field of study.

<http://www.mckinsey.com/industries/social-sector/our-insights/converting-education-to-employment-in-europe>

DECLARATION OF SUPPORT

The main goal of the EU STEM Coalition is to raise awareness among governments, industry and education, at national and European level, about the crucial role of STEM education in our society.

THE EU STEM COALITION:

- Shares good practices in the field of STEM education
- Promotes the triple helix approach (Government, Industry and Education)
- Activates, stimulates and supports Member States to work on a national STEM agenda
- Organises meetings every 6 months to keep moving towards a sustainable approach
- Enables a resilient and future proof Europe

NATION
PLATFORM



AL ☆
RMS



PLATFORM BÈTA TECHNIEK

Implementing a national STEM strategy since 2004, the Platform Bèta Techniek has been commissioned by the Dutch government, the education and business sectors to ensure sufficient availability of people who have a background in STEM. The Platform is supported by the three Ministries of Education, Economic Affairs and Social Affairs and collaborates with multiple businesses and schools of all levels and in all regions of The Netherlands.

The approach of the Platform has first been formulated in the Delta plan Science and Technology, a policy document on how to solve and prevent shortages in STEM sectors. The aims of the Platform are (1) to achieve a structural increase of pupils and students in scientific and technical education, and (2) to use existing talent more effectively in businesses and research institutes. The goal is not only to make careers in science more appealing, but also to introduce educational innovations that will inspire and challenge young people. Since 2013 the Technology Pact unites all ambitions of existing activities and initiatives and aims to achieve

them more quickly and with increased effect. The Technology Pact is a joint initiative of central government, the organised business community, the trade unions, the education community and the regions. The national goal is set to reach that ‘four out of ten choose for STEM’. Following the action lines of going for STEM, learning in STEM and working in STEM, the focus of the implementation - and the key to success – lies in the regions. The regional approach is complemented by arrangements at national level.

The Platform is involved in the European playing field for STEM for quite some time, with a special focus on school-industry collaboration. The Dutch programme Jet-Net (Youth and Technology Network), facilitating the collaboration between schools and companies, has been an inspiration in various occasions and for different countries. The most striking example of this is the 2012 establishment of Jet-Net.dk in Denmark.

Platform Bèta Techniek is strongly convinced of the importance of international exchange of knowledge and experience and the benefits of international cooperation. Being an initiator of the EU STEM Coalition, we look forward to bring this cooperation to a new level and to stimulate and support other member states to establish a successful national STEM strategy.

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ASTRA

Established in 2015 as a merger between several organisations, Astra is the new Danish national centre for learning in science, technology and health. We are an independent organisation affiliated with the Danish Ministry of Children, Education and Gender Equality. Astra has a staff of approximately 45 and is funded 50% by government, 50% by private sources.

It is our mission to be the coordinating and unifying actor strengthening science learning in Denmark and we work to ensure that:

- all young people gain insight into and skills in science subjects, as a formative prerequisite for being an active citizen in the 21st century
- a greater proportion of young people choose science education and careers

Astra runs three large national programmes - the Big Bang science teacher conference with more than 1.000 participants, the National Science Week with 150.000 pupils and the Young Scientists competition with more than 2.000 projects. In addition to that we run a network of Science Municipalities

(strategy for local schools), we do regular teacher workshops all over the country, we advise and evaluate science education projects and we advise the Ministry of Children, Education and Gender Equality on curriculum development. Finally, we work with partners to establish a national STEM education strategy directly inspired by the Dutch Technology Pact.

Our ambition for the future is to strengthen the collaboration between initiatives in Denmark, making strong national programs with many partners and through evaluation raise the knowledge about which methods are best to inspire young people to choose a STEM education.

We think that European collaboration and knowledge sharing between member states is essential for a fruitful development of national STEM strategies and national STEM platforms. Therefore, we strongly support the EU STEM Coalition and expect to take a very active part in the future.



ESTONIAN RESEARCH COUNCIL

The aim of the Estonian Research Council (ETAg) is to support the development and implementation of the national research, development and innovation policies in an efficient way, and to strengthen the social and economic impact and synergy of research and innovation.

ETAg is the main governmental research funding organisation in Estonia, consolidating different grants and types of funding, organising research evaluation and assessments of the effectiveness of grants and being the implementing body for the Estonian research information system. We also support international collaboration of Estonian researchers. ETAg acts as National Contact Point organisation for Horizon 2020 and COST and coordinates EURAXESS network in Estonia.

One of the strands of the ETAg is science communication. We help to get young people attracted to science, technology, engineering and mathematics (STEM), and raise public awareness about science and its importance to society. ETAg is the coordinating body of the Research

and Technology Pact – a cooperation agreement between various partners to allow an increase in the popularity of STEM, to raise the quality of the education and the appreciation for work in these areas. The pact and its action plan are open to anyone who desires to join it and contribute ideas, activities and resources – the activities of the Pact are being implemented in cooperation between the state, local governments, industry, education and third sector. The long term aim is to create synergy between partner’s activities in order to ensure sustainable development in the area, which would guarantee the fulfilment of the goals of national strategies of Estonia.

Our practice has shown that truly close cooperation, sharing the ideas and good practices with partners from other EU countries, has had an important influence on STEM education developments in Estonia. We support the work of the EU STEM Coalition, hoping to give other countries the same valuable experience we have had.

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VLAAMS STEM PLATFORM

In 2012 the Flemish government (Belgium) launched a STEM Action Plan. Its aim is to attract more pupils and students for STEM education and to make sure they occupy STEM related jobs when they graduate. Sixteen STEM experts were appointed to advise the government about the STEM Action Plan, who together constitute the Flemish STEM Platform.

The STEM Platform is positioned as an independent group that advises the STEM Steering Committee and the government of Flanders. The members of the STEM Platform are independent individuals, with a broad background going from business to education, employment office, industry federations and media. In their advice they focus on how to make the Action Plans' formulated actions more concrete

One of the first advices of the Platform was to set clear targets and to focus on three different levels;

- How to get young children involved in STEM?
- How to get more teachers involved in STEM?
- How to share knowledge, communicate and work together with all STEM partners?

This last focus point resulted in the STEM Charter that was launched on 22 November 2015. The Charter unites all that underline the importance and societal relevance of STEM and is meant to enable a national partnership 'pro STEM'. The Charter is already signed by all members of the STEM Platform and many companies, educational institutes and government branches.

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In 2016 the Platform continues the work of around the STEM Charter and develops a portal website for STEM in Flanders, that will assemble all STEM related information.

The Flemish STEM Platform considers international inspiration an important part of the growth and learning curve of national STEM platforms and is looking forward to join in the activities of the EU STEM Coalition.



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DECLARATION
SUPPORT

of the EU STEM Coalition is to promote the development of government, industry and education at European level, about the creation of a STEM education ecosystem.
STEM COALITION:
good practices in the field of STEM education
creates the triple helix model (Government, industry and education)
initiates and supports Member States to work on a national STEM agenda
organizes meetings every 6 months to monitor progress towards a sustainable agenda
enables a resilient and self-sustaining STEM ecosystem

2016-2018
2019-2021
ESTONIA
Target Title
Commitment
16
HIGH LEVEL
2017-2018

SUPPORT PARTNER AND STAKEHOLDERS

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SUPPORTING PARTNERS



ThinkYoung

ThinkYoung is the first think tank that focuses on young people. It was founded in 2007 and has expanded to have offices in Brussels, Geneva and Hong Kong. It is a not-for-profit organisation, with the aim of making the world a better place for young people, by involving them in decision making processes and by providing decision makers with high quality research on key issues affecting young people. ThinkYoung conducts studies and surveys, makes documentary movies, writes policy proposals and develops education programmes: up to date, ThinkYoung projects have reached over 600.000 young people.

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“Our yearly pan-European research “The Skills Mismatch” proves how key STEM skills and competences are. Europe should do more to inspire young people to take STEM courses, to promote both the entrepreneurial and the job opportunities that a STEM skilled person has and to celebrate the successes of people with a STEM background. This is why both ThinkYoung and myself strongly support this Coalition and work hard for a more innovative and open Europe.”

ANDREA GEROSA, FOUNDER AND CHIEF THINKER, THINKYOUNG



FEANI

FEANI is a federation of professional engineers that unites national engineering associations from 35 European countries, bringing together more than 350 national engineering associations, all of which are recognised in their countries as the representatives of the engineering profession at the national level. FEANI represents the interests of over 3.5 million professional engineers in Europe.

“The foundation of our welfare societies is increasingly built on advanced technology and knowledge of the natural sciences. This is why – amongst other reasons - we want to ensure, that young people will obtain a solid education in sciences at primary and secondary school level, to lay the foundation for a lifelong interest and engagement with STEM subjects.”

DIRK BOCHAR, SECRETARY GENERAL, FEANI



Jet-Net.dk

Jet-Net.dk

Started in 2012, Jet-Net.dk is a Danish national network organisation of 56 companies, facilitated by the House of Natural Sciences. Jet-Net.dk focuses on joining schools and companies in co-beneficial 1:1 relationships, in which they collaborate working on Science, Technology, Engineering and Mathematics (STEM). Thereby providing the students in primary and secondary schools with knowledge concerning the activities of the companies, and possible STEM career opportunities within the companies.

“The Danish network and activities is based on feasibility studies and inspiration from the Dutch model of Jet-Net and Platform Bèta Techniek, which makes the Danish Jet-Net a good example of how good practices and practical concepts on a national level can be shared between countries. We have benefited greatly from international cooperation when designing our Jet-Net programme and are looking forward to share our experiences with others within the scope of the EU STEM Coalition.”

NANNA SEIDELIN, CEO, JET-NET.DK AND HOUSE OF NATURAL SCIENCES

PARTNER



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CSR Europe

CSR Europe is the leading European business network for Corporate Social Responsibility. Through its network of around 50 corporate members and 45 National CSR organisations, it gathers over 10,000 companies, and acts as a platform for those businesses looking to enhance sustainable growth and positively contribute to society. In its mission to bring the CSR agenda forward, CSR Europe goes beyond European borders and cooperates with CSR organisations in other regions across the world.

“In the light of the Pact4Youth, which CSR Europe Launched in November 2015 together with the European Commission, we are committed to increase the number and quality of Business – Education partnerships to promote skills development and employability. We believe that national STEM platforms that bring together all the relevant partners (business, education, government) are an excellent way to create sustainable impact. CSR Europe also believes in best practice sharing to increase impact and therefore supports the STEM Coalition.”

STEFAN CRETS, EXECUTIVE DIRECTOR, CSR EUROPE



ECSITE

Ecsite is the European network of science centres and museums. Ecsite's vision is to foster creativity and critical thinking in European society, emboldening citizens to engage with science. Its mission is to inspire and empower science centres, museums and all organisations that engage people with science, and to promote their actions. Founded more than 25 years ago, the network now gathers more than 350 organisations in Europe and world-wide.

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“Ecsite members believe that science capital is an essential condition for a well-functioning democracy and support initiatives that stimulate creativity and critical thinking among citizens. We advocate for the involvement of citizens in the research process and champion a culture of innovation. Therefore, Ecsite supports all efforts for coordinated national STEM strategies in Europe.”



STATEMENTS EUROPEAN STAKEHOLDERS



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“As also mentioned in our publication on youth unemployment, ERT supports the interaction between business, education, government and other stakeholders to identify and exchange on how STEM and ICT skills shortages can be tackled in a structural way with long-term impact. The EU STEM Coalition is definitely contributing to this purpose.”

*BRAIN AGER, SECRETARY GENERAL,
EUROPEAN ROUND TABLE OF INDUSTRIALISTS*



“Increasing the supply of people with Science, Technology, Engineering, and Mathematics (STEM) related skills is a key component for Europe’s competitiveness and productivity gains. STEM skills are needed across a broad range of economic sectors and can be acquired through a mix of education and training pathways. Starting at an early age it is important to embed STEM learning into school curricula, including with the involvement of employers, and to continue to provide STEM-related subjects and training opportunities throughout secondary and tertiary level education. Vocational education and training, notably apprenticeships, as well as universities can help to meet the demand for medium and higher level STEM skills. The EU STEM Coalition is a good initiative for fostering mutual learning between Members States.”

MARKUS J. BEYRER, DIRECTOR GENERAL, BUSINESSEUROPE



“An interministerial ‘Mission STEM’, commissioned by three Ministries is currently ongoing in France. The EU STEM Coalition has been asked by the Mission STEM to brief them on STEM platform practices elsewhere and to identify industry partners willing to engage. These exchanges have been much appreciated as have the international comparisons brought by the EU STEM Coalition.”

JEAN-LUC DELPEUCH, CONSEIL GÉNÉRAL DE L’ÉCONOMIE & CHRISTINE SZYMANKIEWICZ, INSPECTRICE GÉNÉRALE DE L’ADMINISTRATION DE L’ÉDUCATION NATIONALE ET DE LA RECHERCHE, FRANCE

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“The EP Education Committee welcomes the EU STEM Coalition initiative because it is both trans-European in nature as well as benefiting individual citizens, as it encourages a more strategic way of looking at the peoples’ talents and how this can be best used by ensuring people have competences that will help address 21st century challenges and provide citizens economic prosperity as well as societal well-being”

SILVIA COSTA, MEP, CHAIR OF THE COMMITTEE ON CULTURE AND EDUCATION OF THE EUROPEAN PARLIAMENT

THANK
YOU





THANK YOU

This brochure is the result of joint effort of the EU STEM Coalition members and supporting stakeholders within the European Union. The EU STEM Coalition team sincerely thanks all for their contribution to the brochure and the good work they do, nationally and Europe-wide, by promoting the importance of STEM education.

COLOPHON

STEM Skills for a Future-proof Europe

is a publication of the EU STEM Coalition,
assembled in Europe, designed and
printed in The Netherlands

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Design

BUREAUBAS – www.bureaubas.nl

Print

Drukproef – www.drukproef.nl

European Union, April 2016

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**EU STEM
COALITION**

Science Technology
Engineering Mathematics