



Image: David Wisniewski

Introducing STEM PD Net to Policy Makers

We live in a society where school is one of the most important building blocks. From research we know that teachers and their competencies are one of the most prominent factors determining students' educational results. It is important that today's young people develop problem-solving skills so that they are able to think analytically about cases and eventually become the researchers, creative innovators and imaginative individuals we need for a future sustainable society.

STEM education can contribute to this!

STEM is the acronym for Science, Technology, Engineering and Mathematics. The valued outcomes of STEM Education are: developing science literacy for all students; preparing them for advanced degrees and technical careers; and raising the future workforce to support a nation's prosperity and economic competitiveness. And this within a sense of active citizenship fostering equity, diversity and preventing radicalization.

STEM education integrates concepts that are usually taught as separate subjects in different classes and emphasizes the application of knowledge to real-life situations. A lesson or

unit in a STEM class is typically based around finding a solution to a real-world problem and tends to emphasise project and inquiry-based learning.

Preparing Teachers for STEM Education

STEM teachers are expected to develop the mathematical, scientific, technological expertise that students need to be competitive in the 21st century workforce. But STEM goes far beyond preparing students for specific jobs. It develops a set of thinking, reasoning, team-working, investigative and creative skills that students can use in all areas of their lives. For such an important responsibility teachers need access to professional development.

What is STEM PD Net?

The objective of STEM PD-Net is to strengthen the position, relevance, quality and knowledge base for STEM PD on a large scale. To provide as many teachers as possible with relevant and high-quality professional development (PD) courses, many countries have, in recent years, set up national professional development centres. The European STEM

Professional Development Centre Network grew out of the idea that these national centres should be connected internationally since they have similar aims and agendas, namely: investing in teacher professional development to substantially improve STEM education as it happens day-to-day in schools. Despite different national circumstances, foci and structures, the national PD Centres across Europe encounter similar concerns and challenges. International collaboration therefore is an essential element of sharing good practice.

STEM PD Net was formed in 2014 and received Erasmus+ funding from 2016 to bring together teachers, universities, ministries, unions, PD centres, namely all stakeholders who take active role in professional development of teachers. The network consists of STEM PD centres from countries across Europe.



Image: U.S. Department of Energy

Active cooperation between STEM PD providers and policy makers is vital

To meet these objectives and ambitions it is necessary that policy makers, STEM PD Centres and STEM PD providers find common ground. This introductory paper is intended to draw policy makers' attention to our work. This includes research outcomes and evidence describing effective professional development in different contexts, from kindergarten level, via pre-school and primary school to upper secondary school.

The innovative linking of research, practice, international exchange and opportunities for mutual benefit are key to STEM PD-Net. Our consortium addresses the need for cooperation between policy makers and STEM PD providers on regional, national and European levels.

The network promotes knowledge exchange in order to improve local practices in STEM

professional development and strengthens the voice of practice when it comes to shaping STEM education in Europe.

Policy support on regional, national and European level

The importance of policy support for STEM PD cannot be overestimated and so our network deliberately addresses policy makers at various levels and within various sectors. Supporting policy makers to connect, communicate, agree and cooperate with STEM PD providers is therefore one of the main aims for the STEM PD Net.

Policy Making in Three Arenas

What policy makers do we want to reach? Research shows that the governance of an educational system can be seen as three arenas mutually affecting each other. Policy makers in the different arenas can play important roles for STEM PD in this interplay. STEM PD-Net will facilitate awareness and connections between the actors in the three arenas in order to develop innovative solutions to PD issues.

1. The Formulation Arena

This arena includes most of the formal policy makers. National and regional decisions are made regarding curricula, budgets, professional development, teacher education, and regulations concerning STEM education and STEM PD. The actors are, for example, national Ministries of Education, Inspectorates, regional or national Agencies of Education, Curriculum Development Centres, Universities, Teacher Education providers, and local community School Boards.

2. The Transformation Arena

This arena consists mainly of the informal policy makers, such as textbook publishers, industry and industry organizations, media, NGO's, political parties, teacher unions, STEM PD Centres, foundations and other funds supporting STEM PD etc. National and regional political activities and decisions are interpreted and transformed into different projects, publications and campaigns.

3. The Realisation Arena

In this arena STEM PD activities take place. The main actors are teachers and teacher students together with PD providers. Other actors include principals, parents and parent's unions - and their viewpoints may differ from the messages from actors in the Formulation Arena.

Governance

Governing an educational system is concerned with how the funding, provision, ownership and regulation of education and training systems is coordinated. Taking into account these three arenas can offer a new perspective on how different actors can engage themselves in the STEM PD landscape. For example, in the long term, activities in the Realisation arena impact on activity in the Transformation arena. Actors in the Transformation arena can have impact on curriculum change in the Formulation arena. The results of collaborative projects between actors in the Formulation and Transformation arenas will be of interest and be can influence projects at regional, national and European level

What can STEM PD Net offer?

- (1) setting up research-based criteria for high-quality PD and enriching these with good-practice examples
- (2) developing ready-to-use guidelines on how to measure the success of teacher PD in day-to-day settings as a means of quality assurance in relation to
- (3) developing a catalogue for policy makers and STEM PD providers, showcasing good-practice examples on how to prepare teachers to deal with diversity
- (4) collating an annotated collection of STEM PD aims, projects, resources and materials allowing policy makers and PD providers to easily find and select materials with a focus on their purpose, content, quality and potential.

Supporting STEM teaching through strengthening partnerships with and among PD practice by:

- (1) setting up a European STEM PD centre network as a stable partnership among PD providers and
- (2) strengthening the national position of STEM PD centres and their potential for forming effective local partnerships through the involvement in the European network,
- (3) promoting a compendium of PD provider models to encourage ways forward to establish new specialized centres in STEM PD across Europe where they do not yet exist,
- (4) strengthening the voice of European PD centres through the development of a set of policy briefings and strengthened partnerships to communicate with Policy Makers.



Get in contact with us!

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Information about the Policy Briefing

IO N°7

Publication date: 28/04/2017

Title: Policy Briefing on: Introducing the STEM PD Net to Policy Makers

Project Information

Grant no. 2016-1-DE03-KA201-023103

Project title: European Network of STEM Professional Development Centres

Project acronym: STEM PD Net

Start date of project: 01/09/2016

Duration: 36 months

Program: Erasmus+, Key Action 2 (KA2) – Strategic Partnerships

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Pictures:

1. David Wisnieski, <https://www.edsurge.com/news/2014-08-11-the-science-of-learning-three-strategies-for-improving-stem-education>
2. Image: U.S. Department of Energy, <https://energy.gov/diversity/federal-and-external-stem-education-resources>
3. STEM PD Net

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This briefing is based on the work within the project European Network of STEM Professional Development Centres (STEM PD Net). Coordination: Prof. Dr. Katja Maaß, International Centre for STEM Education (ICSE) at the University of Education, Freiburg. Partners: SOU Lyuben Karavelov, Koprivshitsa, Bulgaria; Prezidento Valdo Adamkaus Gimnazija, Lithuania; Ministry of National Education, Kizilay-Ankara, Turkey; Texas Instruments Education Technology GmbH, Freising, Germany; Institute of Mathematics and Informatics at the Bulgarian Academy of Science, Sofia, Bulgaria; Ugdymo Pletotes Centras, Vilnius, Lithuania; Universität Innsbruck, Innsbruck, Austria; Linköping University, Linköping, Sweden; Ministerio de Educación, Cultura y Deporte de España, Madrid, Spain; Alpen-Adria-Universität Klagenfurt, Klagenfurt, Austria; University of Gothenburg, Gothenburg, Sweden; Hacettepe University, Ankara, Turkey; Universität Duisburg-Essen, Essen, Germany.

The project European Network of STEM Professional Development Centres (STEM PD Net) has received co-funding by the Erasmus+ programme of the European Union.

The creation of these resources has been co-funded by the Erasmus+ programme of the European Union under grant no. 2016-1-DE03-KA201-023103. Neither the European Union/European Commission nor the project's national funding agency PAD are responsible for the content or liable for any losses or damage resulting of the use of these resources.