INTRODUCTION TO STEM EDUCATION

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WHAT IS STEM EDUATION?

- **Definition:** STEM is the acronym for Science, Technology, Engineering and Mathematics.
- **Context:** It involves all levels of education from pre-school to higher education, both in formal and informal settings.
- **Scope:** In a more general way, it can also refer to scientific literacy, scientific thinking and STEM skills, relevant for both STEM and non-STEM careers.

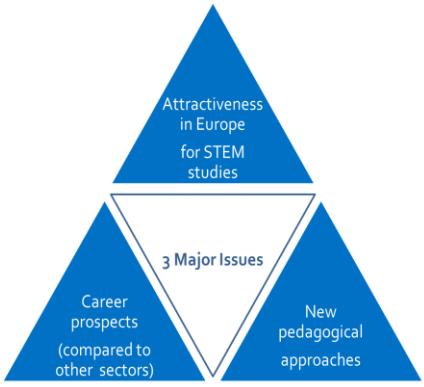
WHY THE EMPHASIS ON STEM EDUCATION?

Main critical aspects:

- STEM education and career attractiveness (relatively low);
- Labor market needs in this sector (high in the projections);
- Pedagogical methods (need to be closer to real world)
- Science literacy for all citizens (to be widened for inclusion purposes);
- Gender equity in accessing STEM education and careers.

Source: *EUN Academy, Durando M., 2014*

3 Major issues regarding the situation of STEM in Education



A cross-sectoral approach is fundamental in order to support the knowledge triangle and any integrated actions in related policy areas (education, employment, entrepreneurship, social inclusion etc.).

GLOBAL STUDENTS PERFORMANCE IN SCIENCE AND MATHEMATICS

TIMSS 2015

TIMSS is an international assessment of mathematics and science at the fourth and eighth grades that has been conducted every four years since 1995. TIMSS 2015 is the sixth assessment in the TIMSS series monitoring 20 years of trends in educational achievement, together with comprehensive data on students' contexts for learning mathematics and science.

Main findings from TIMSS 2015…

- In Science, the top three achievers at 4th grade are Singapore, Korea and Japan while at 8th grade those are Singapore, Taiwan and Chinese Taipei.
- In Mathematics, the top three achievers at 4th grade are Northern Ireland, the Russian Federation and Norway while at 8th grade those are the Russian Federation, Kazakhstan and Canada.

How many advanced physics and mathematics students are being educated? The International Achievement in Advanced physics and Mathematics results show us the numbers for the STEM professionals of the future:

International Achievement in Advanced Physics:

- Slovenia (with 8% of its students in TIMSS Advanced physics) had the highest average in advanced physics achievement.
- France, Norway, the Russian Federation, and Sweden had lower average achievement in 2015 than in 1995.
- Italy (18%) and France (22%) had the highest percentages of students in TIMSS Advanced physics, but the lowest average achievement.

International Achievement in Advanced Mathematics:

- Russian students in intensive study (2% of students enrolled 6 hours-plus per week courses) had the highest advanced mathematics achievement, along Lebanon (4% enrolled in TIMSS Advanced).
- France, Italy, and Sweden had lower average achievement in 2015 than in 1995.

A prevalent challenge is that of attracting girls in STEM, as more males are enrolled in Advanced Physics and Mathematics programs in all countries assessed.

Source: *http://timss2015.org/*

PISA 2015

The OECD Programme for International Student Assessment, or PISA, assesses to which extent 15-year-old students have acquired key knowledge and skills that are essential for full participation in modern societies. PISA data on educational outcomes are collected every three years. PISA 2015 is the sixth round of this survey; it has a special focus on science performance.

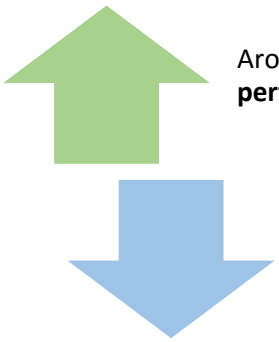
Main findings from PISA 2015…

Science

- In **science, Singapore** outruns all other participating countries/economies**. Japan, Estonia, Finland** and **Canada**, in descending order of mean science performance, **are the four highest countries among OECD participants.**

Mathematics

- **Singapore** has the **highest** performance in **mathematics** among all participating countries and economies. **Hong-Kong (China), Macao (China)** and **Chinese Taipei** are the next **four highest performing countries.**



Around **8% of students across OECD countries are top performers** in **science.**

Approximately **20% of students across OECD countries perform below Level 2,** chosen as the baseline level of proficiency in **science**

Equity in education

- Canada, Denmark, Estonia, Hong Kong (China) and Macao (China) achieve **high levels of performance and equity in education outcomes.**
- Among OECD countries, **socio-economically deprived students are almost three times more likely than advantaged students not to acquire the baseline level of proficiency in science.**
- Across OECD countries, taking socioeconomic level into account, **immigrant students are more than twice as likely as non-immigrant to perform under the baseline level of proficiency in science,** on average.
- In 33 countries and economies, **the share of top performers in science is greater among boys than among girls** (on average). Nonetheless, gender disparities in science performance tend to be modest. Girls are more likely to be top performers than boys only in Finland
- 25% of boys and 24% of girls expressed that they expect to work in a science-related job (on average and across OECD countries). Nonetheless, **boys and girls differ in relation to the science working fields/area.**

EU STUDENTS PERFORMANCE IN SCIENCE AND MATHEMATICS

Performance of EU countries in PISA 2015 with regard to the ET2020 benchmark. PISA 2015 results.

The OECD Programme for International Student Assessment (PISA) is the **basis for the ET 2020 benchmark on underachievement of 15-year olds in basic skills.** The indicator states that **by 2020, the share of 15-year-olds who are low achievers in reading, maths and science should be less than 15% in the EU.**

Main findings from PISA 2015…

1. In regard to **progress towards the 2020 benchmark of less than 15% low achievers, the EU as a whole is lagging behind in mathematics, science and reading** and has not improved results, compared to the PISA 2012 results.
2. Gender differences are not as strong as they used to be: **the difference between the shares of low achievers in mathematics and science between boys and girls continues to be minor**.
3. **Socio-economic status continues to be a strongly significant factor for 15-year-old students' achievement in science**, with much higher shares of low achievers among students with lower socio-economic status than among students coming from a higher one.
4. In most EU Member States, **a student's immigrant background is an additional factor associated to high shares of low achievers**[1].
5. **Involvement in pre-primary education is strongly connected with higher performance among 15-year-olds**.

Science

- In 2015, **only two EU Member States (EE, FI) reach the ET2020 benchmark and have a share of low achievers that is below 15%.**
- **The average share of low achievers in science in the EU is 20.6%,** more than five percentage points above the benchmark aspired for 2020.
- Despite the considerable variation among EU Member States, **there are still too few Member States close to the benchmark that they aim to reach by 2020.**
- The proportion of **students who score below proficiency Level 2 in science is particularly high in some EU countries** (above 30% in SK, MT, EL, BG, RO, CY).

[1] Even though there is a correspondence with the effects of socio-economic background, too many of immigrant students do not achieve the required basic skills, even among those born in the country where the test was taken.

- **The average share of low achieving students in science in EU Member States has grown sharply in PISA 2015 (20.6%), compared to PISA 2012 (16.6%) and PISA 2009 (17.8%)[2].**
- **The share of low achievement in science in the EU average is only very slightly higher among boys (20.7%) than it is among girls (20.4%).** This difference is even more negligible and has further gone down in the EU average since 2012.

Mathematics

- **Among the three domains, the share of low achievers is highest in mathematics, just like in previous years and almost unchanged**; it was 22.2% on average in the EU Member States in 2015, up only slightly, by 0.1 percentage point compared to PISA 2012 (22.1%) and only slightly lower than in PISA 2009 (22.3%).
- **There are only three Member States that reached the benchmark** in 2015: EE (11.2%), DK and FI (13.6% each), with IE right at 15%. Only four countries have a share of low achievers between the benchmark value and 20%[3]. **The share of low achievers is above average in twelve Member States[4].**
- Compared to 2012 and in contrast to the general trend, **twelve EU Member States were able to reduce their share of low achievers in mathematics[5]**. This **contrasts with an increase in the share of low achievers in mathematics in several EU countries, which is especially unfortunate in those Member States that already were above the benchmark in 2012**.
- Similar to previous years, PISA data shows for 2015 that **there are no outstanding differences in the share of low achievers in math and science between boys and girls**, with slightly higher shares of boys in most cases. Across EU countries, **the percentage point difference between the shares of boys and girls below level 2 in mathematics remained small**. In no Member State, the difference is much higher than 5 percentage points.
- In mathematics, there is no clear pattern for the higher shares of boys or girls among low achievers, although the EU average shows a **slightly higher share of low achieving girls, at 23.2%, compared to boys at 21.2%.**

Source: *https://ec.europa.eu/education/sites/education/files/pisa-2015-eu-policy-note_en.pdf*

[2] Even though there have been substantial changes in the PISA methodology in 2015, this is an indication that EU countries are not making sufficient progress towards reducing the share of low achievers in science.
3 SI: 16.1%, NL: 16.7% and PL and DE: 17.2%).
4 IT (23.3%), FR (23.5%), PT (23.8%), LT (25.4%), LU (25.8%), SK (27.7%), HU (28.0%), MT (29.1%), HR (32%), EL (35.8%), RO (39.9%), BG (42.1%) and CY (42.6%).
[5] Only marginally in some countries (between -0.1 and -0.9 percentage points: HU, DE, LT, RO), between -1 and -2 percentage points in five other (IE, BG, ES, IT, PT), and more substantially in three others: SE (-6.2 percentage points), SI (-4.0 percentage points), DK (-3.3 percentage points).

EUROPE 2020 STRATEGY FOR SMART GROWTH

One of the three main priorities for Europe 2020 lays in "smart growth", that is the development of an economy based on innovation and knowledge. In that regard, a European strategy must put an accent in the following areas. Data from 2010 showed that:

- **Education, training and lifelong learning:** one in seven pupils abandon the educational/training too early. Around half of them acquire medium level qualifications and less than one person in three aged 25-34 has a university degree. This composition usually fails to match the needs of the labor market.
- **Innovation:** In Europe, R&D spending is below 2%, due to relatively low levels of private investment. The EU recommends to look at both the composition and expected impact of research spending as well as in the enhancement of the conditions for R&D in the private sector.
- **Digital society:** Only a quarter of the global demand for information and communication technologies comes from European firms.

Source: *http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf*

LABOR MARKET SITUATION IN STEM

Demand for STEM professionals

- Data from 2014 shows that, within STEM jobs, 40% of them correspond to STEM Professionals[6] whilst 60% correspond to STEM associate professionals, data from 2015 says[7].
- In 2014, 48% of STEM-related occupations required medium level qualifications (although this number is predicted to descent to 46% in 2025). These are normally acquired through initial upper-secondary level VET.
- In the EU, employment of STEM professionals and STEM associate professionals grew around 12% from 2000 to 2013. Demand for both STEM professionals and associate professionals is likely to increase by 8% (the average growth forecast for all occupations between 2013 and 2025 is 3%).

[6] *"STEM professionals encompass a wide range of knowledge-intensive occupations including scientists (i.e. physicists, mathematicians and biologists), engineers and architects". (EP, 2015)*

[7] *"STEM associate professionals encompass technical occupations connected with research and operational methods in science and engineering, including technicians in physics, life science and engineering; supervisors and process control technicians in industry, ship and aircraft and ICT technicians". (EP, 2015)*

- In the case of STEM-related sectors, demand has been estimated to rise by 6.5% between the years 2013 and 2025. However, major differences across sectors can be found. While employment is expected to rise by 8 % in computing and by 15% in professional services, no employment growth is expected in the pharmaceuticals sector.
- According to CEDEFOP's forecasting, approximately two-thirds of the estimated job opportunities for STEM-related professions will substitute retiring workers.

Supply of STEM professionals

- The number of STEM university graduates in EU28 increased by 37% from 2003 to 2012. On the contrary, **the number of VET graduates in STEM-related subjects decreased by 11% between 2006 and 2010 and increased slightly since 2010.**
- **The share of STEM university graduates at EU level has remained generally stable in relation to the total number of university graduates**, with a slight variation from 22.3% to 22.8% between 2006 and 2012.
- This average disguises relevant variation across countries. In fact, **the only common and continuing trend is the underrepresentation of women among STEM university graduates**, which only accounted for a 12.6% in comparison with a 37.5% of male graduates.
- A decline in the share of STEM VET graduates is the predominant trend at the national level. The EU average has slightly decreased from 32% in 2006 to 29.4% in 2011.

Bottleneck vacancies

- The report "Mapping and analyzing bottleneck vacancies in EU labor markets" defines bottleneck occupations as **"occupations where there is evidence of recruitment difficulties, i.e. employers have problems finding and hiring staff to fill vacancies**". This report shows that **a large majority of EU28 countries have recently experienced recruitment difficulties in relation to STEM skills.**
- Since 2008, **employment in the EU28 has increased for STEM professionals but declined for associate professionals.** Similarly, shortages seem to be more acute in technological fields (engineering and ITC) and more common for STEM professionals than for associate professionals: out of 29 countries analyzed, 21 report difficulties in relation to science and engineering professionals, 20 for ICT professionals and 14 for science and engineering associate professionals.

Table 2: STEM occupations among the top 20 bottleneck vacancies at European level

Vacancies at ISCO 2-digit level		Vacancies at ISCO 4-digit level	
Rank	**Occupation (ISCO-08 code)**	**Rank**	**Occupation (ISCO-08 code)**
2	Science and engineering professionals (21)	7	Mechanical engineers (2144)
3	Information and communications technology professionals (25)	8	Electrical engineers (2151)
7	Science and engineering associate professionals (31)	12	Systems analysts (2511)
		15	Software developers (2512)

Source: EC 2014.

Source: *European Commission (2014): Mapping and analyzing bottleneck vacancies in EU labor markets*[8]

Initiatives to encourage STEM studies

- In order to encourage younger generations to pursue STEM studies and professional careers, several policy approaches have been identified. C. Kearney identifies them as it follows: **(1) Development of effective and attractive STEM curricular and teaching methods (2) Enhancement professional development and training for teachers** and **(3) Guiding of younger generations towards STEM careers through initiatives that tackle the social perception of science and STEM professions, career guidance and information on the labor market.**

Source: *http://www.scientix.eu/observatory/comparative-analysis-2015*

Cooperation with employers

- Current initiatives with the aim of encouraging students to follow STEM careers increasingly aim to develop further collaboration between companies and schools.
- Building relations between students and educators in schools and STEM professionals in the workplace is crucial in order to guide pupils towards STEM. This can be organized through visits from STEM professionals or university students to schools or by teachers and students to places of work.

8 *The ISCO-2 and ISCO-4-digit level references, refer to the ILO classification – p.30*
http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_172572.pdf

- Recent education reforms have also been implemented in order to strengthen links between education and the labor market sphere through "involving companies and social partners in curricula development in VET" in several countries as a way to ensure that provision of professionals is in line the varying economic needs.
- Marketing campaigns and initiatives to attract young people to relevant educational paths are being currently developed by a number of professional employers in sectors facing skills shortages.

Source: *http://www.europarl.europa.eu/RegData/etudes/STUD/2015/542199/IPOL_STU(2015)542199_EN.pdf*

YOUTH UNEMPLOYMENT AND PROFESSIONAL MISMATCH

Youth unemployment

- Under the education and training 2020 strategy, **the EU aims to reach an employment rate of 82 % for recent graduates aged 20-34.** Data shows that the employability of graduates in Europe increased for the second consecutive year, by 0.9 percentage points from 2014 and 1.5 percentage points from 2013, reaching 76.9 % in 2015 (78.6 % for male graduates and 75.3 % for female graduates).
- Nonetheless, the EU has not yet regained the pre-crisis employment rates for recent graduates, which peaked in 2008 at 82 %. While 12 EU Member States have employability rates above 80 %, the labour market prospects of young graduates are a pressing concern for countries such as EL and IT, where less than 50 % of recent 20-34 year-old graduates are employed.

Source: *http://ec.europa.eu/education/sites/education/files/monitor2016_en.pdf*

Occupational mismatch

- Across the EU, 25% of employed tertiary education graduates work in an occupation that would conventionally not be regarded as of requiring a tertiary qualification.
- While the data used in creating these proportions is not completely accurate[9], they are able to highpoint latent problems in the functioning of current labor markets. Individuals working in jobs

[9] *"The full picture of occupational mismatch is difficult to capture for a number of reasons. Firstly, the OECD's Survey on Adult Skills (PIAAC) showed that there is a substantial difference between qualification and skill mismatch. Secondly, labor market characteristics affect these mismatches and require their own policy intervention. And thirdly, both supply and demand differ also within countries, between sectors and occupations, and across time, which makes it difficult to anticipate trends. Going beyond the rudimentary measures possible at EU level, Member States are increasingly improving their own forecasts with more refined data". (EC, 2015)*

beneath their qualifications might not be satisfied with their jobs thus being more prone to change jobs more often. Long-term, they risk losing their previously acquired skills, too.

- Recommendations to avoid it include labor market forecasts, graduate tracking and promotion of work-based learning in higher education -not only in vocational education and in training (VET)-.

Source: *http://ec.europa.eu/education/library/publications/monitor15_en.pdf*

FOCUS ON A SELECTION OF NATIONAL STATE OF THE PLAY

STEM education - State of play - Belgium

National stakeholders involved in STEM

Flanders:

- Flemish department of Economy, Science and Innovation
  http://www.ewi-vlaanderen.be/en
- Flemish department of Education and Training
  http://onderwijs.vlaanderen.be/nl/node/4915
- Technopolis®
  https://www.technopolis.be/en/visitors/

Wallonie:

- Administration générale de l'Enseignement et de la Recherche scientifique de la Communauté française de Belgique
  http://www.enseignement.be/

National policies and programmes

- STEM Framework for Flemish Schools Principles and Objectives. Flanders State of the Art. Department of Education and Training.
  www.ewi-vlaanderen.be/sites/default/files/documents/STEM_actieplan_def.pdf

Initiatives, projects, good practices of national relevance, involving companies

- Jeunesses scientifiques
  www.jsb.be
- Promotion of STEM Careers (Flemish STEM Platform)
  www.onderwijskiezer.be/v2/extra/stem_downloads.php

STEM education - State of play - France

National stakeholders involved in STEM

- Ministry of National Education, Higher education and Research
  http://www.education.gouv.fr/
- Fondation La main à la pâte
  http://www.fondation-lamap.org/en/

National policies and programmes

- *LOI n° 2013-595 du 8 juillet 2013 d'orientation et de programmation pour la refondation de l'école de la République. Department for National Education, Higher Education and Research.*
  https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000027677984&categorieLien=id
- *Enseignement primaire et secondaire. Promotion des disciplines scientifiques et technologiques. Une nouvelle ambition pour les sciences et les technologies à l'école. Department for National Education, Higher Education and Research.*
  http://www.education.gouv.fr/cid55255/mene1105413c.html
- Sciences à l'école
  http://www.sciencesalecole.org/
- Universciences
  www.universciences.fr/fr/accueil

Initiatives, projects, good practices of national relevance, involving companies

- Les Maisons pour la Science. Académie des Sciences. Fondation La main à la pâte.
  www.maisons-pour-la-science.org
- Course en cours
  http://www.course-en-cours.com/fr/

STEM education - State of play - The Netherlands

National stakeholders involved in STEM

- Ministry of Education, Culture and Science.
  https://www.government.nl/ministries/ministry-of-education-culture-and-science
- Ministry of Economic Affairs
  https://www.government.nl/ministries/ministry-of-economic-affairs
- Kennisnet Foundation

https://www.kennisnet.nl/about-us/

- The National Platform Science & Technology. Platform Bèta Techniek. https://www.platformbetatechniek.nl/extra/english

National policies and programmes

- The National Platform Science & Technology – Platform Beta Techniek www.platformbetatechniek.nl/home
- National Technology Pact 2020 www.rijksoverheid.nl/documenten-en-publicaties/convenanten/2013/05/13/nationaal-techniekpact-2020.html
- National Engineering Pact 2020 https://www.rijksoverheid.nl/documenten/convenanten/2013/05/13/samenvatting-nationaal-techniekpact-2020
- Framework for literacy and numeracy http://www.taalenrekenen.nl/downloads/referentiekader-taal-en-rekenen-referentieniveaus.pdf/

Initiatives, projects, good practices of national relevance, involving companies

- JET-NET Youth and Technology Network www.jet-net.nl/english
- Human Capital Agendas in Top Sectors www.hcatopsectoren.nl
- Weekend of Science http://www.hetweekendvandewetenschap.nl/

STEM education - State of play - Norway

National stakeholders involved in STEM

- Ministry of Education and Research https://www.regjeringen.no/en/dep/kd/id586/
- Norwegian Centre for ICT in Education https://iktsenteret.no/english
- National Center for Science in Education http://www.naturfagsenteret.no/

National policies and programmes

- Science for the Future - Strategy for Strengthening Mathematics, Science and Technology (MST) 2010-2014
  www.regjeringen.no/globalassets/upload/kd/vedlegg/uh/rapporter_og_planer/science_for_the_future.pdf
- Gender equality action plan 2014 (Including access to STEM)
  www.regjeringen.no/globalassets/upload/bld/action_plan_2014.pdf

Initiatives, projects, good practices of national relevance, involving companies

- Lektor2 Scheme. Cooperation with social partners on the teaching of science
  www.lektor2.no
- School of the Future Ullern High school (UHS) and Oslo Cancer Trust (OCT)
  http://oslocancercluster.no/portfolio-item/talent-workforce-education

STEM education – State of play - Sweden

National stakeholders involved in STEM

- Ministry of Education and Research
  http://www.government.se/government-of-sweden/ministry-of-education-and-research/
- Swedish National Agency for Education
  http://www.skolverket.se/
- Teknikforetagen. The Association of Swedish Engineering Industries
  http://www.teknikforetagen.se/

National policies and programmes

- NTA. Science and Technology for All
  www.ntaskolutveckling.se/In-English
- Country Report Sweden 2015 Including an In-Depth Review on the prevention and correction of macroeconomic imbalances. Broader paths from school to work through vocational education and apprenticeships
  http://ec.europa.eu/europe2020/pdf/csr2015/cr2015_sweden_en.pdf
- EURYDICE. National Reforms in School Education
  https://webgate.ec.europa.eu/fpfis/mwikis/eurydice/index.php/Sweden:National_Reforms_in_School_Education

Initiatives, projects, good practices of national relevance, involving companies

- The Problem Solver

http://problemlosarna.nu

- Ingenjorsvagen

  http://www.ingenjorsvagen.se

STEM education - State of play - United Kingdom

National stakeholders involved in STEM

- Department for Education

  https://www.gov.uk/government/organisations/department-for-education

- The Department for Business, Innovation and Skills

  https://www.gov.uk/government/organisations/department-for-business-innovation-skills

- National STEM Centre

  https://www.stem.org.uk/

National policies and programmes

- 2010 to 2015 government policy: public understanding of science and engineering

  https://www.gov.uk/government/publications/2010-to-2015-government-policy-public-understanding-of-science-and-engineering/2010-to-2015-government-policy-public-understanding-of-science-and-engineering

- Your Life

  http://yourlife.org.uk

Initiatives, projects, good practices of national relevance, involving companies

- STEM Ambassadors Scheme

  http://www.stemnet.org.uk/ambassadors

- Future in Food Programme

  www.sfdf.org.uk/sfdf/schools_programme

STEM education - State of play - Spain

National stakeholders involved in STEM

- Ministry of Education, Culture and Sport

  http://www.mecd.gob.es/portada-mecd/

- Spanish Foundation for Science and Technology (FECYT)

  https://www.fecyt.es/

- Other STEM centers:

- CSIC. Scientific Research Council
  http://www.csic.es/
- INTEF National Institute of Educational Technologies and Teacher Training
  http://educalab.es/intef
- COSCE. Confederation of Scientific Societies of Spain
  http://www.cosce.org/
- ANQUE. National Association of Chemists of Spain
  http://anque.es/

National policies and programmes

- Organic Law 8/2013, of December (LOMCE)
  http://www.mecd.gob.es/educacion-mecd/mc/lomce/lomce/paso-a-paso.html
- *Orden ECD/65/2015, de 21 de enero, por la que se describen las relaciones entre las competencias, los contenidos y los criterios de evaluación de la educación primaria, la educación secundaria obligatoria y el bachillerato*.
  http://www.boe.es/diario_boe/txt.php?id=BOE-A-2015-738

Initiatives, projects, good practices of national relevance, involving companies

- Xplore health
  http://www.xplorehealth.eu/
- mSchools
  http://mschools.mobileworldcapital.com/
- heirri
  http://heirri.eu/
- Mobile World Capital Barcelona
  http://mobileworldcapital.com/

STEM education – State of play – Italy

National stakeholders involved in STEM

- Ministry of Education, Universities and Research
  http://www.istruzione.it/
- Istituto Nazionale di Documentazione, Innovazione e Ricerca Educativa (INDIRE)
  http://www.indire.it/
- Other STEM centers:
  - UMI - CIIM (Italian Union of Mathematics)

http://www.umi-ciim.it/

- AIF (Physics Teachers Association)

  http://www.aif.it/

- ANISN (Natural Sciences Teachers National Association)

  http://www.anisn.it/nuovosito/

- DD-SCI (Didactic Department of the Italian Chemistry Association):

  https://www.soc.chim.it/it/divisioni/didattica/home

- Accademia Nazionale dei Lincei

  http://www.lincei.it/

- National Association for physics teaching

  http://www.aif.it/

National policies and programmes

- National Plan for Digital Schools

  http://hubmiur.pubblica.istruzione.it/web/istruzione/piano_scuola_digitale

- National CDP teacher training courses (ran by INDIRE)
  - PON educazione scientifica

    http://formazionedocentipon.indire.it/?cat=3

  - Mat@abel

    http://formazionedocentipon.indire.it/?cat=4

Initiatives, projects, good practices of national relevance, involving companies

- ENI Scuola

  http://www.eniscuola.net/

- Progretto Nerd

  http://www.progettonerd.it