European Committee of the Regions

SEDEC-VI/049

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OPINION

Strengthening STE(A)M education in the EU

THE EUROPEAN COMMITTEE OF THE REGIONS

- points out that while the growth of innovation-intensive economic sectors such as ICT, robotics, automation, technical research and development, logistics and various engineering activities is expected to continue in a sustained way, it could be hampered by inappropriate implementation of STEM education;
- is concerned at the fact that three major shortcomings have been observed in relation to STEM in recent decades:
  i. there is a Europe-wide shortage of teachers specialised in STEM at all levels of education;
  ii. in many cases, students' interest in STEM is decreasing;
  iii. the results produced by the education system are not always in line with the needs of the labour market;
- considers that it is now time for the European Commission, alongside the ambitious European Education Area plans, to ensure that all the STEM-related priorities are addressed in its direct management of relevant EU programmes;
- further recommends that the Commission fosters the showcasing and exchange of best practices in the STEM field also through a dedicated EU portal;
- recommends that coordinated efforts should be taken by the European Commission and by the Member States in ensuring
  - a non-gender biased approach in STEM education, counselling and curriculum development,
  - the Women in Digital (WID) scoreboard, which is the European Commission's annual scoreboard to monitor women's participation in the digital economy, be extended to assess also women's acquisition of STEM skills and inclusion in STEM jobs,
  - that the language rights of ethnic and linguistic minorities are safeguarded in innovative educational efforts too, so their educational materials and curricula must not lag behind,
  - direct and effective action and exchange of good practices in reaching out to youth in the education system and NEETs both to attract them to STEM courses and jobs.

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Rapporteur

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Reference document

Opinion of the of the European Committee of the Regions – Strengthening STE(A)M education in the EU

I. POLICY RECOMMENDATIONS

THE EUROPEAN COMMITTEE OF THE REGIONS

1. welcomes the recognition by a large proportion of European local and regional authorities of the fact that significant opportunities and responsibilities lie before them when it comes to defining a coherent and integrated approach to STEM (science, technology, engineering and mathematics) education and the development of skills and abilities relating to these subjects, which are increasingly found all over the world and at every level of education;

2. points out that while the growth of innovation-intensive economic sectors such as ICT, robotics, automation, technical research and development, logistics and various engineering activities is expected to continue in a sustained way, it could be hampered by inappropriate implementation of STEM education;

3. considers that while, in the case of STEM, there are certainly decades-old, tried and tested teaching methods, the material conditions for which are in place, there is nevertheless a need for further action given the importance of having more teachers able to cross the traditional boundaries between disciplines and foster an interdisciplinary educational approach based on applied research and scientific method and on projects, and in light of the fact that in many cases, the need to invest in this field has not so far been reflected in the national educational policies of the Member States;

4. emphasises that STEM education does not mean simply passing on the various scientific subjects or disciplines separately. One of the basic principles is that their teaching must be planned and delivered not in isolation, but as part of a coherent cross-subject approach under a system which in practice is multi-disciplinary;

5. notes that, according to various studies, in the medium to long term the number of jobs in sectors related to STEM will rise significantly, and in almost all Member States unemployment rates are lowest in these sectors;

6. warns that, according to the World Economic Forum[1], the dichotomy between humanities and sciences does not prepare new generations for the new cross-functional roles for which employees will need technical, as well as social and analytical skills. Thus, calls for a strong STEAM focus, that equips pupils and students with complex problem solving, creativity, critical thinking, people management and cognitive flexibility;

7. attaches importance to the fact that, given the results in STEM subjects at international level, it is worth focusing not only on higher education but also on laying the foundations for these subjects at all levels from primary education onwards. This can be achieved by broadening the

1 The World Economic Forum, Global Challenge Insight Report, January 2016.

range of basic skills that should be available to everyone to include basic STEM skills, and particularly technical and scientific literacy;

8. considers that, in keeping with the principles of subsidiarity and multi-level governance, thought should be given to how the local and regional level can help, on the basis of the open method of coordination, to fill existing gaps and mismatches between STEM-related training systems, workforces and jobs by means of coordination, so creating a European level playing field;

9. with a view to subsidiarity and decentralisation within the Member States, calls for a full awareness of the role that local and regional authorities who finance or in some other way support education networks unquestionably have in this process, since they play a key role in mobilising EU funds;

10. considers that STEM-related initiatives, strategies, action plans and public-private partnerships implemented at local and regional level can play an important role in bridging the gap in development between the various regions. In many cases, improving competences linked to STEM-related jobs does not require the use of expensive traditional educational infrastructure, and there are also many opportunities, especially in vocational education and adult training, for organising specialised, short-term training courses, sometimes only a few months in duration. Local and regional authorities may have a positive impact in this regard, given that the presence of a competent STEM workforce is a decisive factor in determining the competitiveness of a region. Treating STEM subjects as a local and regional educational priority, as well as prioritising collaborative initiatives and investment with regard to their development, can go a long way towards limiting the harmful effects of the brain drain by offering career opportunities that are suitable for the active STEM workforce;

11. considers that professional bodies and organisations that are active and well established at local and regional level should also be involved in planning and carrying out training courses; this would increase the effectiveness of the STEM-related approach and promote local and regional added value and interests;

12. in view of the programming of the cohesion policy funds for 2021-2027, and in line with the European Semester Country Reports issuing guidance to this effect, urges the European Commission and the Member States to give due priority to supporting STEM-related initiatives at local and regional level and take the measures needed to ensure that the necessary investment is drawn from Member State or EU funds, and that cohesion policy planning has a more targeted approach to shortages of STEM skills. Also urges the Commission, when drawing up the Employment Guidelines and under the "Enhanced labour and skills supply", which addresses structural weaknesses in education and training systems, to encourage Member States to duly support STEM-related initiatives since they can, contribute to preserving a knowledge-based economic model in Europe that can develop successfully while also being inclusive and supportive of equal opportunities;

13. considers that it is now time for the European Commission, alongside the ambitious European Education Area plans, to ensure that all the STEM-related priorities are addressed in its direct

management of relevant EU programmes; further recommends that the Commission fosters the showcasing and exchange of best practices in the STEM field also through a dedicated EU portal;

14. recommends that coordinated efforts should be taken by the European Commission and by the Member States in ensuring
   - a non-gender biased approach in STEM education, counselling and curriculum development,
   - the Women in Digital (WID) scoreboard, which is the European Commission's annual scoreboard to monitor women's participation in the digital economy, be extended to assess also women's acquisition of STEM skills and inclusion in STEM jobs,
   - that the language rights of ethnic and linguistic minorities are safeguarded in innovative educational efforts too, so their educational materials and curricula must not lag behind,
   - direct and effective action and exchange of good practices in reaching out to youth in the education system and NEETs both to attract them to STEM courses and jobs.

   Also calls for concrete actions to challenge gender stereotypes, promote women's STEM skills and education and advocate for more women in STEM-related employment and entrepreneurship;

15. is concerned at the fact that three major shortcomings have been observed in relation to STEM in recent decades:

   i. there is a Europe-wide shortage of teachers specialised in STEM at all levels of education;
   ii. in many cases, students' interest in STEM is decreasing;
   iii. the results produced by the education system are not always in line with the needs of the labour market;

16. believes however that these issues should not be seen as a problem but as a practical challenge to be met, and that an effective response hinges on appropriate planning, setting up local and regional partnerships and cooperation with employers; furthermore, the fact that only nine Member States currently have a national STEM strategy underlines how urgent it is for this question to be addressed by all Member States and optimally through local and regional strategies;

17. points out that the proportion of women in these training courses and professions remains low, meaning not only that an enormous amount remains to be done in terms of gender equality, but also that this field and these professions offer potential for growth. For young girls, role models can play an important part in encouraging them to consider a STEAM field. For all ages, it is necessary to introduce a number of measures, including career guidance programmes and targeted study and apprenticeship grants. Studies show that closing the gender gap in STEM would contribute to an increase in EU GDP per capita of 2.2% to 3.0% and would increase employment in the EU by 850 000 to 1 200 000 jobs by 2050, while equal participation of women in the rapidly growing yet highly segregated ICT sector would lead to a gain of around EUR 9 billion in EU GDP each year[2];

2 European Institute for Gender Equality (EIGE), 2017: Economic Benefits of Gender Equality in the EU.

18. notes that currently, across 35 European countries, fewer than 1 in 5 computer science graduates are women[3]. Points out that, addressing the gender STEM-related skills gap is all the more essential since job creation is increasingly concentrated in STEM-related sectors, with some 120 000 ICT new jobs being created each year. According to the European Commission, Europe could face a shortage of up to 900 000 skilled ICT workers by 2020[4]. Underlines to this effect that helping more girls and women to embrace STEM requires a partnership among parents, educational institutions, all levels of government and industry, with encouragement and mentoring and promotion of female role models being key components;

19. also detects significant opportunities for regional and civic universities in disseminating STEM, as STEM-related university courses and disciplines can be internationalised, which can make them particularly attractive for ambitious universities. This is also due to the fact that reorienting STEM, i.e. developing teamwork, facilitating inter-professional synergies, supporting and increasing the availability of internships, strengthening project-based education and increasing the participation of disadvantaged or disabled students or those from minority backgrounds in education and training activities, can transform regions, universities and vocational schools into pioneers when it comes to ensuring that they are able to seize the opportunities offered by STEM at an early stage;

20. emphasises that if STEM courses are organised at local and regional level, specific local knowledge can be incorporated into the available training, which in turn will also increase opportunities and skills for local and regional authorities in this regard;

21. points out that STEM subjects could also benefit from specific local and regional solutions and traditions through the incorporation of elements related to the arts, creativity and design and that, at the same time, this addition provides STE(A)M with real opportunities for innovation in teaching and training which - if successfully applied - could also enable Europe's regions to set a good example across the world, giving additional impetus to their growing capacity for innovation, since incorporating the arts could give a major boost to creativity in this field. Recalls that, according to a recent OECD study[5], arts education is increasingly important in innovation-driven societies, with an increasing number of universities developing new types of interdisciplinary curricula;

22. considers that, firstly, it would be helpful to extend STEM- and STE(A)M-related awareness and promotion activities to parents and, secondly, that it is crucial to identify the best methods for attracting children's attention in an appropriate way to STEM subjects at a very early stage, starting at the pre-school level;

23. calls on the European Commission to take the necessary measures concerning the continuation and renewal of the Bologna process and work leading to the automatic recognition of

3 OECD Gender Data Portal, Where are tomorrow's female scientists (https://www.oecd.org/gender/data/whereareTomorrowsFemaleScientists.htm).

4 Digital skills, jobs and the need to get more Europeans online (https://ec.europa.eu/commission/commissioners/2014-2019/ansip/blog/digital-skills-jobs-and-need-get-more-europeans-online_en).

5 Art for Art's Sake? The impact of Arts education (https://read.oecd-ilibrary.org/education/art-for-art-s-sake_9789264180789-en#page1).

qualifications, and urges it to ensure that the question of the rapid mutual recognition of qualifications and training in the STEM and arts areas be addressed urgently and appropriately;

24. encourages Member States and the European Commission, using the available tools and in agreement with local and regional authorities, by involving regional and civic universities too, to map out curricula for STEM and STE(A)M at different levels of education. This would make it possible to introduce STEM more easily and flexibly, even as a local education programme; calls on the European Commission to propose an integrated STEM competence framework with a view to improving comparability and attainment standards in the EU;

25. urges the European Commission and Eurostat to fine-tune the data-gathering method in line with their relevance, to ensure that education systems in which STEM are taught as separate disciplines and systems based on a holistic interpretation of STEM can be clearly distinguished, and to clarify the overall regional dimension, which will also make it easier to prepare local and regional STEM strategies.

Brussels, 26 June 2019

The President
of the European Committee of the Regions

Karl-Heinz Lambertz

The Secretary-General
of the European Committee of the Regions

Jiří Buriánek

II. PROCEDURE

Title	Strengthening STE(A)M education in the EU
Reference(s)	
Legal basis	Article 304 TFEU
Procedural basis	Own-initiative opinions – Rule 41 b) ii) of the Rules of Procedure
Date of Council/EP referral/Date of Commission letter	
Date of Bureau/President's decision	4 December 2018
Commission responsible	Commission for Social Policy, Education, Employment, Research and Culture
Rapporteur	Csaba Borboly (RO/EPP)
Analysis	January 2019
Discussion in commission	2 April 2019
Date adopted by commission	2 April 2019
Result of the vote in commission (majority, unanimity)	Unanimous
Date adopted in plenary	26 June 2019
Previous Committee opinions	Building a stronger Europe: the role of youth, education and culture policies[6] Strengthening European Identity through Education and Culture[7] Modernising school and higher education[8] Investing in Europe's youth and the European Solidarity Corps[9] A new skills agenda for Europe[10] Recognition of skills and competences acquired through non-formal and informal learning[11] Opening up Education[12] European higher education in the world[13] Rethinking education[14] Erasmus for All[15] Promoting the active citizenship of young people through education[16]

6 COR 3952/2018.

7 COR 6048/2017.

8 COR 3139/2017.

9 COR 851/2017.

10 COR 4094/2016.

11 COR 3921/2014.

12 COR 6183/2013.

13 ODR 5961/2013.

14 COR 2392/2012.

15 COR 400/2011.

Date of subsidiarity monitoring consultation	–

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16 COR 173/2007.