



European  
Commission

# Addressing the gender gap in STEM education across educational levels

*Analytical report*



Education and  
Training

**Please cite this publication as:**

Evagorou, M., Puig, B., Bayram, D. and Janeckova, H. (2024). Addressing the gender gap in STEM education across educational levels, Executive Summary, *NESET report*, Luxembourg: Publications Office of the European Union. doi: 10.2766/32315.

**ABOUT NESET**

NESET is an advisory network of experts working on the social dimension of education and training. The European Commission's Directorate-General for Education and Culture initiated the establishment of the network as the successor to NESET II (2015-2018), NESSE (2007-2010) and NESET (2011-2014). The Public Policy and Management Institute (PPMI) is responsible for the administration of the NESET network. For any inquiries please contact us at: [infoneset@ppmi.lt](mailto:infoneset@ppmi.lt).

**AUTHORS:**

- **Maria Evagorou**, Associate Professor, University of Nicosia
- **Blanca Puig**, University Lecturer, University of Santiago de Compostela
- **Dury Bayram**, Assistant Professor, Eindhoven School of Education
- **Hedvika Janeckova**, Research Director, PPMI

**PEER REVIEWER:**

- **Dragana Avrmov**, NESET Scientific Coordinator

**REPORT COORDINATOR:**

- **Stéphanie Crêteur**, PPMI

**LANGUAGE EDITOR:**

- **James Nixon**, freelance editor

**EUROPEAN COMMISSION**

Directorate-General for Education, Youth, Sport and Culture  
Directorate A — Policy Strategy and Evaluation  
Unit B2 — Schools and multilingualism

E-mail: [EAC-UNITE-B2@ec.europa.eu](mailto:EAC-UNITE-B2@ec.europa.eu)

European Commission  
B-1049 Brussels

**CONTRACTOR:**



PPMI Group  
Gedimino ave. 50, LT - 01110 Vilnius,  
Lithuania  
Phone: +370 5 2620338 Fax: +370 5  
2625410  
[www.ppmi.lt](http://www.ppmi.lt)  
Director: Rimantas Dumčius

EUROPEAN COMMISSION

# **Addressing the gender gap in STEM education across educational levels**

*Evagorou, M., Bayram, D., Puig, B. & Janeckova, H.*

## LEGAL NOTICE

This document has been prepared for the European Commission however it reflects the views only of the authors, and the European Commission is not liable for any consequence stemming from the reuse of this publication. More information on the European Union is available on the Internet (<http://www.europa.eu>).

---

PDF

ISBN 978-92-68-06830-4

doi: 10.2766/32315

NC-09-23-395-EN-N

---

Luxembourg: Publications Office of the European Union, 2024

© European Union, 2024



The reuse policy of European Commission documents is implemented by the Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39). Except otherwise noted, the reuse of this document is authorised under a Creative Commons Attribution 4.0 International (CC-BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>). This means that reuse is allowed provided appropriate credit is given and any changes are indicated.

For any use or reproduction of elements that are not owned by the European Union, permission may need to be sought directly from the respective rightholders. The European Union does not own the copyright in relation to the following elements: [cover Image(s) © [carloscastilla + 11900361], 2012. Source: [depositphotos.com]

## Executive summary

### Context and rationale

Despite significant advances in STEM education and a growing emphasis on gender equality in research and policy circles, women across Europe remain under-represented in STEM careers and among graduates majoring in STEM-related fields. Key insights from this report highlight several critical aspects in relation to this issue:

- Educational achievement vs. pursuing a career: women and girls often outperform or match men and boys in academic achievements within certain field STEM fields such as biology, but this success does not translate into equivalent representation among STEM professions. This discrepancy underlines a complex interaction of factors that go beyond academic capability and which influence women's career choices and opportunities in STEM.
- Career entry and retention: the transition from education into a career in STEM displays marked gender disparity. Men with STEM degrees are significantly more likely than their female counterparts to continue into STEM careers. This trend suggests that the barriers to entry and retention in STEM careers are more formidable for women, necessitating deeper investigation into workplace cultures, career progression opportunities, and the support mechanisms available for women in STEM.
- Progress is evolving yet insufficient: although there has been some reduction in the gender gap in STEM over the past decade, the pace of change remains slow and uneven across different STEM disciplines and countries. This persistent gap, despite heightened focus and interventions, indicates that existing strategies may not fully address its root causes, or that their implementation lacks the necessary scale or focus to effect widespread change.
- Societal and cultural influences: societal perceptions of gender roles within STEM fields, as well as broader cultural attitudes towards women's participation in science and technology, significantly impact the STEM gender gap. These influences can affect the self-perception, confidence and career aspirations of young women, pointing to the need for societal-level interventions alongside educational reforms.

The examination of the above elements by the present NESET report highlights the multifaceted nature of the gender gap in STEM education and careers. This issue calls for a comprehensive, multi-level approach that encompasses educational reforms, policy interventions, societal attitude shifts and targeted support mechanisms to bridge this gap effectively. Addressing the gender gap in STEM is not only a matter of educational equity but also an issue of critical economic and societal concern, given the increasing importance of STEM fields in driving innovation, economic growth and addressing global challenges.

### Objective of the report

This report aims to consolidate current research findings, policy analyses and best practices in relation to gender disparities in STEM education. This consolidation effort seeks to build a cohesive understanding of the gender gap, drawing on diverse sources including academic studies from 2014-2023, grey literature and evaluations of EU-funded projects. In particular, the report examines the links with science and mathematics education due to their significance in EU curricula, in comparison to those with technology and engineering, and the relative scarcity of integrated STEM subjects. Through this analysis, the report provides a foundation for informed decision-making and strategy development.

A key objective of the report is to systematically identify and analyse the factors at individual, contextual and institutional levels that contribute to the gender gap in STEM education. This includes examining aspects such as societal attitudes, educational practices, curriculum design and the role of educators in shaping gender perceptions and choices in STEM. Understanding these factors is crucial to developing targeted interventions.

In addition, the report aims to identify effective strategies and interventions that have been successful in enhancing girls' interest, participation and persistence in STEM from an early age. This involves analysing initiatives across various levels of education, from early childhood through to higher education, in order to identify scalable and replicable practices that can be adopted across different contexts.

Drawing on its analysis of influential factors and successful strategies, the report aims to offer actionable recommendations for policy-makers, educators and other stakeholders. These recommendations are intended to address systemic barriers, promote gender-inclusive educational environments and foster a sustained increase in girls' participation in STEM fields.

## Methodology

The methodology employed in this report comprises a literature review complemented by an analysis of EU-funded projects, chosen to shed light on the systemic factors that hinder, as well as strategies to enhance, the engagement of girls in STEM. The literature review analyses published academic studies accessed through the ERIC database, along with grey literature. This extensive collection of sources has been instrumental in capturing a broad spectrum of perspectives and findings related to gender disparities in STEM.

In parallel, the analysis of EU-funded projects – drawn from databases including Scientix, CORDIS and the Erasmus+ projects portal – provides a practical lens through which the report examines initiatives specifically designed to support girls in STEM. This aspect of the methodology focuses in particular on identifying, evaluating, and drawing lessons from interventions that have been implemented across Europe with the financial backing of the EU. The selection criteria used to identify these projects ensured that only those projects with a direct emphasis on gender and STEM education were included. To explore the issue across educational levels, the search focused on studies, research projects and policies targeting various age groups, from early childhood education to college.

## Findings

The findings of the report reveal that studies carried out over the past decade have predominantly explored individual-level factors such as attitudes and motivation, but lack definitive conclusions as to the drivers of the gender gap in STEM. Overall, the report's key findings regarding the gender gap in STEM education pinpoint factors and strategies across individual, contextual and institutional levels:

1. *Individual-level factors*: it has been found that girls often show lower self-efficacy in STEM subjects compared with boys, despite achieving similar or better academic performance. This suggests that confidence plays a crucial role in girls' decisions to pursue STEM further. Self-efficacy, influenced by gender perceptions and societal expectations, is a significant predictor of sustained interest in STEM. Pedagogical strategies, including gender-neutral approaches, are highlighted for their potential to enhance self-efficacy among both girls and boys.

2. *Contextual-level factors*: family and the broader societal context are highlighted as playing a vital role in shaping girls' decisions regarding STEM education and careers. Early exposure to STEM, supportive environments and the overcoming of societal stereotypes are essential to maintaining girls' interest in STEM fields. The report points out a gap in current research, highlighting the lack of recommendations for robust strategies to help challenge entrenched gender stereotypes in families. While parental engagement in STEM is recognised as crucial, there is a notable absence of the promotion of comprehensive support and targeted policies for families from varying socioeconomic backgrounds. This lack of support highlights the need for further research and the development of interventions aimed at promoting equitable STEM participation for all.
3. *Institutional-level factors*: barriers at the level of educational institutions, including curricula that are not gender-inclusive, teaching practices that reinforce stereotypes, and a lack of female role models in STEM, contribute to the gender gap. Gender-sensitive teaching methods and the integration of STEM subjects are identified as strategies to enhance girls' participation in STEM.
4. *Successful strategies*: the analysis of EU-funded projects contained in this report reveals several promising practices for addressing the gender gap, such as mentorship programmes, gender-neutral and inclusive teaching approaches, and projects designed to increase girls' engagement in STEM through hands-on, real-world applications. Innovative pedagogical strategies including problem-based learning and interdisciplinary teaching display potential to boost girls' interest and self-efficacy in STEM.

As a general conclusion, the report emphasises the need for systemic changes and advocates policies that support gender equality in STEM education and the promotion of STEM education from an early age, as well as highlighting the importance of professional development for educators in the adoption of gender-sensitive pedagogies.

Moreover, the report highlights the absence of comprehensive strategies to tackle institutional barriers to STEM education. While pedagogical strategies in STEM education are being developed, the lack of comprehensive institutional policies and programmes represents a considerable obstacle. This gap is particularly important to the system of support for women and girls in STEM, highlighting an urgent need for targeted institutional interventions to create a more inclusive and supportive educational environment for all students. The report highlights the effectiveness in reducing the STEM gender gap of specific practices and interventions, such as gender-sensitive teaching, gender-neutral teaching and innovative learning settings.

## **Recommendations**

Based on their study of academic papers, policy reports and EU-funded projects, the report's authors make the following suggestions:

- Systematic evaluation of STEM education is essential. While many initiatives assess their outcomes, there is a lack of a comprehensive approach to evaluating those factors that influence and sustain students' interest in STEM. Future efforts should employ experimental designs that rigorously examine these factors, drawing on existing research.
- Emphasise self-efficacy in STEM. There is evidence that individuals with higher self-efficacy in STEM achieve better outcomes and remain in these fields longer. Further research is required to understand the impact of this individual-level factor. Surveys designed to measure self-efficacy, administered before and after interventions, could shed light on ways to enhance it. Addressing the so-called

'confidence gap' is crucial to narrowing the gender disparity in STEM, as high self-efficacy is linked to better performance and persistence in these fields.

- Conduct research to establish the criteria necessary for creating gender-inclusive STEM learning environments and methodologies. Such research would include studies on teachers' perceptions and training in relation to STEM and gender, taking into account various influencing factors. Although there are many studies and toolkits aimed at addressing the gender gap in STEM, the EU lacks consistent policies, a unified understanding of STEM and systemic strategies to tackle this gender disparity.
- Develop policies and practices that focus on teacher professional development, promoting alternative teaching methods that support student self-efficacy and participation. This involves adopting integrated STEM practices and gender-responsive approaches, particularly from an early age, and assessing their implementation in the classroom.
- Advocate for systemic national and local policies that support gender-sensitive or gender-neutral approaches to education. Such policies should aid families, teachers, policy-makers and researchers in creating supportive environments for students. The aim of such measures should be to provide comprehensive support through changes at both contextual and institutional levels.
- Encourage policy reforms in teaching and learning that favour evidence-based pedagogical approaches to fostering interest in STEM, such as integrated STEM. Breaking down barriers between STEM disciplines is seen as vital to equipping students with 21st-century skills; however, the adoption of integrated STEM approaches remains limited across the EU Member States. A collaborative effort is needed to understand and effectively address the gender gap in STEM education.



## GETTING IN TOUCH WITH THE EU

### In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: [https://europa.eu/european-union/contact\\_en](https://europa.eu/european-union/contact_en)

### On the phone or by email

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

- by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),
- at the following standard number: +32 22999696, or
- by email via: [https://europa.eu/european-union/contact\\_en](https://europa.eu/european-union/contact_en)

## FINDING INFORMATION ABOUT THE EU

### Online

Information about the European Union in all the official languages of the EU is available on the Europa website at: [https://europa.eu/european-union/index\\_en](https://europa.eu/european-union/index_en)

### EU publications

You can download or order free and priced EU publications from: <https://op.europa.eu/en/publications>. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see [https://europa.eu/european-union/contact\\_en](https://europa.eu/european-union/contact_en)).

### EU law and related documents

For access to legal information from the EU, including all EU law since 1952 in all the official language versions, go to EUR-Lex at: <http://eur-lex.europa.eu>

### Open data from the EU

The EU Open Data Portal (<http://data.europa.eu/euodp/en>) provides access to datasets from the EU. Data can be downloaded and reused for free, for both commercial and non-commercial purpose

