Abstract

Historically, women's access and participation in Science, Technology, Engineering and Mathematics (STEM) have been hardly hampered or even forbidden, considering the traditional understanding of roles within societies. In addition, characteristics like the ethnicity, country of origin, beliefs, disabilities, social and financial backgrounds, and gender (which includes how gender is perceived and which gender is identified, recognised and self-declared), often become a discriminant factor when starting a STEM path. For years, diversity has been considered a minor factor and very few has reached to create a more equal and fair society where diversity can be embraced to foster the access to growth opportunities. According to some recent statistics (OHCHR –UN Guide for Minorities, 2019), diversity is now a topic that stands already at the core of the global population and policies.

This paper aims at exploring the type of actions that civil society organisations, in collaboration with Universities, SMEs, corporates, and associations, can use to raise awareness about gender balance within STEM and contribute to European policies effectively. After a short overview of the recent European policies on gender and inclusion within STEM, this paper tackles the context by addressing how organisations could translate and elaborate on gender balance within society, whether they support a gender inclusive environment and support a parallel path in integration and innovation.

This paper will also showcase a flagship project devoted to this topic: EQUALS-EU: Europe’s Regional Partnership for Gender Equality in the Digital Age. It is a 3-year project funded by the EU Horizon 2020 Framework Programme, coordinated by OsloMet University and involving 19 organisations from Europe and beyond. The scope of the partnership is to question the current situation on gender equality within STEM and identify potential role models to inspire girls in pursuing STEM careers and empower women in joining and taking leadership roles especially in ICT. Indeed, digital inclusion is the key to providing new pathways and novel solutions for ensuring that women and girls can participate in the entire sphere of economic, social, political, and cultural life.

Besides the policy context and the current European partnership experience, this paper will also share, as a case study, several raising awareness activities carried out by the ALL DIGITAL NGO, a pan-European network of educational organisation providing training activities to enhance digital competences across Europe and beyond.

In conclusion, this paper will contribute to identifying already existing initiatives, policies, and actors to stimulate more initiatives and opportunities to foster a gender-inclusive, and overall inclusive, innovation ecosystems for a more equal, fair society. And it will bring forward ideas about the role of civil society organizations and the overall focus and opportunities they can foster at international level to facilitate a more gender equality and overall diverse society, especially within STEM.

Keywords: Women in STEM, gender-inclusive innovation, gender equality, partnership, European projects, digital inclusion.

1 INTRODUCTION

Women’s access and participation in Science, Technology, Engineering and Mathematics (STEM) education and carriers have been hardly hampered or even forbidden, considering the traditional understanding of roles within societies. In addition, characteristics like the ethnicity, country of origin, beliefs, disabilities, social and financial backgrounds, and gender (which includes how gender is perceived and which gender is identified, recognised and self-declared), often become a discriminant factor when starting a STEM path. For years, diversity has been considered a minor factor and very few has reached to create a more equal and fair society where diversity can be embraced to foster the access to growth opportunities.
According to some recent statistics\(^1\), diversity is now a topic that stands at the core of the global population and policies. The lack of representation in academic and professional careers or institutions has consequences and affect minorities’ lives every day: the gender gap has been wide, enforced by role’s stereotypes and gender bias.

Studies demonstrate that specifically computer science, engineering and technology fields show the hugest gender imbalances, from current students, to graduates and the workforce models\(^2\). Women are still often discouraged to begin and pursue a STEM career; the few ones that follow their aspirations find more difficulties in the first phase to be accepted by their peers and later, within the labour market, where men prevail in the sector. In addition, the gender pay gap question is still open\(^3\): working women are still paid less than men, although they do the same activities\(^4\).

During the last decade, the question of gender gap attracts attention from the main international institutions and policies: The UN sets the Goal 5 – Gender Equality of the Agenda 2030\(^5\) as a prerequisite for sustainable development, supporting and encouraging girls and women with a proper agency, the UN Women. The EU recognizes gender equality as a principle and count on the European Institute of Gender Equality (EIGE) to enforce its respect, throughout the positive effect of law and conferences to sensibilize on the topic. The efforts are slowly showing their outcomes: although the percentage is still low, the number of women and girls in STEM is growing. This turning point is important to inspire future generations in making more consistent and aware choices for themselves and follow their dreams.

### 2 CLOSING THE GENDER GAP: AN EU PRIORITY

The EIGE highlights the “strong positive correlation between gender equality in the labour market and economic growth” and has shown in its study on the economic benefits of gender equality in the EU that “reducing the gender gap in STEM education areas could help reduce skills gap, increase employment and productivity of women, and reduce occupational segregation. Ultimately this would foster economic growth via both higher productivity and increased labour market activity.”\(^6\)

The EU is committed to gender equality across all its policies as set in its Gender Equality Strategy for 2020-2025: “The goal is a Union where women and men, girls and boys, in all their diversity, are free to pursue their chosen path in life, have equal opportunities to thrive, and can equally participate in and lead our European society.”\(^7\) Within this framework, gender equality has also become a priority in the Horizon Europe funding programme both in terms of research areas and in the gender equality criterion set for the organisations that apply for funding.

WEGate, The European Gateway for Women’s entrepreneurship, is an online platform launched by the European Commission to support women’s entrepreneurship by facilitating the access to knowledge and resources, as well as offering a community for exchange and mentoring. According to the WEgate annual survey, “while women make up 52% of the total European population, only 34.4% of the European Union (EU) are self-employed and 30% of start-up entrepreneurs are women.” EU tackles the gender equality in innovation and entrepreneurship in parallel to STEM education and carriers. The respondents of the survey mentioned that “Women’s business networks offered the most effective support for women starting a business in their country” while they top two types of support they required were “networking programs” and “mentoring programs”.\(^8\)

The EU is strongly supporting initiatives to close the gender gap in technology and innovation through funding schemes and open frameworks and programmes, including the “Women TechEU - a new EU scheme supporting deep-tech start-ups led by women and helping them grow into tomorrow’s deep tech champions”.\(^9\)

The gender equality in STEM is an important pillar in the EU’s Innovation Agenda as the inclusion of girls and women is critical to meet the climate neutrality through deep innovation by 2050. EU sets a

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\(^6\) [https://sgds.un.org/goals/goal5](https://sgds.un.org/goals/goal5)  
clear link between “between promoting transversal – digital and entrepreneurial – skills, STEM disciplines, and the green and digital transitions. Innovation, novel perspectives, and creative solutions in these fields are vital for a prosperous and sustainable future. Therefore, it is crucial that diverse actors, including women and under-represented groups, take part in ensuring a more inclusive and just transition.”

Departing from this idea, the EU initiative Girls Go Circular supports schoolgirls, and more broadly, any student, to develop their digital and leadership skills while learning about the circular economy and finding solutions for a sustainable future.

Additionally, Women & Girls in STEM Forum is an annual event organised by Girls Go Circular in collaboration with the European Commission, Directorate-General for Education, Youth, Sport and Culture (DG EAC). It contributes to the discussion on achieving a carbon-neutral, circular economy and addressing the gender gap in education and training. It is a major platform bringing together policymakers, industry leaders, and students to advance the European agenda on gender equality in STEM education and careers.

According to the Women & Girls in STEM Forum’s 2022 Policy Brief, the main challenges in closing the gender gap in STEM and ICT education and careers are:

- Gender stereotypes in primary and secondary education.
- Gender-biased organisational cultures, structures, and processes in the labour market.
- Insufficient exposure to female role models.
- Lack of ample support for female entrepreneurs.

Among the pathways to closing the STEM and ICT gender gap stated in the policy brief, the approaches identified to address these challenges are “deconstructing gender stereotypes from early childhood years”, implying a focus within the school system and overall culture, “connecting STEM and ICT to concrete societal challenges”, suggesting to grounding these topics into everyday life aspects, issues, and debates, “targeting the innovation ecosystem and labour market” and “increasing the visibility of female role models and their success stories” by connecting generations and stimulating ideas generations approaches.

As mentioned in the EQUALS report by UNICEF and ITU: “We cannot afford to live in a world where scientific and technological solutions are desperately needed – and exclude half of the world’s talent. We need girls and women.”

3 \textbf{EQUALS-EU: EUROPE’S REGIONAL PARTNERSHIP FOR GENDER EQUALITY IN THE DIGITAL AGE}

EQUALS- Europe’s Regional Partnership for Gender Equality in the Digital Age is one of the key initiatives working for closing the gender gap in social innovation. Coordinated by OsloMet University and involving 19 organisations from Europe and beyond, the project aims to:

- Build capacity through multilateral partnerships that strengthen existing and formalize new networks for in social innovation and entrepreneurship.
- Create smart, sustainable, and inclusive social innovation ecosystems in local communities and cities in Europe and in non-European countries in the Global North and South.

“Progress towards gender equality in Europe and worldwide was moving slowly, and COVID-19 pandemics has put that to hold or even regressed it. The information society presents new possibilities for generating and distributing wealth and knowledge. Active participation of women in the information society is a matter of justice and equality. Digital inclusion is the key to providing new pathways and novel solutions for ensuring that women and girls can participate in the entire sphere of economic, social, political, and cultural life.

10 https://eit-girlsgocircular.eu/women-and-girls-in-stem-forum/

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EQUALS-EU aims to build capacity in gender-inclusive innovation in Europe and partner countries worldwide with an ambitious and value-driven agenda. It is an initiative funded by the EU Horizon 2020 Framework Programme and implemented as part of the EQUALS Global Partnership.

EQUALS-EU is centred around four key activities that leverage expertise from global leaders in gender-inclusive innovation and innovative ideas and commitment of future female leaders:

- Analysis and assessment of gender-inclusive innovation ecosystems in more than 20 countries.
- Hosting innovation camps and hackathons in more than 25 countries.
- Running a six-month incubator program focused on gender-inclusive entrepreneurship.
- Organizing a summer school for future leaders in gender inclusive innovation.

According to the project’s scientific and methodological work in the first year, “the gender equity in digital and social innovation can be addressed in at least these two ways:

- Supportive structures for female innovators and innovation businesses.
- Innovations that address gender equity issue or an issue of specific relevance for women.

In addition, the existing partnerships or collaborative relationships between organisations is stronger with global organisations such as the European Union and UN bodies that are supporting work towards gender equality. In-country or regional collaborations were rather disparate, suggesting the need to stress and invest more on efforts to strengthen networks regionally, as well as nationally. EQUALS-EU will leverage on the strong networks such as those with the European Union and UN bodies that appear to connect different initiatives working with gender equity in social and digital innovations, to work towards strengthening and even creating networks regionally and nationally.

The findings also show that there is strong knowledge about existing policies that promote and support gender equity. Global policies take on regional, national and similarly trickle down to local communities in their framing of the focus and efforts on working towards gender equality. Responding organisations also noted that most of the policies that they were aware of were being implemented to a certain extent.

The report concludes by looking at the constructive relationship between gender and innovation, and notes that the lingering biases are still anchored by a binary view of men and women. A strong recommendation that is also offered by several organisations is to approach gender equality in digital and social innovations by looking at the relationships that happen between genders, and then drawing on this data to frame processes and products with a gender inclusive lens.

The EQUALS-EU project also developed and publicly shared a methodology – a course description and repository of materials for consortium partners to help them design innovation camps and hackathons with an aim to co-create innovative solutions for gender equity and digital inclusion.

This manual includes guidance for all related activities such as planning, coordinating, managing, hosting, promoting, and evaluating these co-creation events and can be used by the wider public.

The winning teams of the hackathons and innovation camps are currently involved in a training and mentoring programme with the aim to lead them towards generating start-ups to further develop their ideas. The EQUALS-EU consortium will host an international summer school and professional development boot camp to elevate future leaders and role models in gender equity and digital inclusion and provide recommendations for future adoption of the tested methodology and courses to build capacity in non-European countries in the Global North and South.

The EQUALS-EU project was created from the EQUALS Global Partnership wider network, “a ground-breaking global initiative delivered by a committed network partnership of businesses, governments, non-profit organizations, foundations, academia, media and individuals around the world working together to bridge the digital gender divide. The EQUALS Global Partnership works to reverse the increasing digital gender divide, and to close the gap by 2030 – supporting UN Sustainable Development
Goal 5 by empowering women through their use of information and communication technologies.”

While the EQUALS-EU aims to create a European hub to keep on working for the objective of fostering gender equality in the digital age after the project life, it maintains strong link with the global partnership and aligns the European framework with the UN Sustainable Development Goals (SDGs).

The EQUALS-EU consortium hosted the “Perceptions of Power: Championing Female Leadership in the Digital Age” on 4 August 2022 that brought together almost 90 representatives of the mobile and tech industries, academia, civil society, international organisations, and youth from across the globe to dispel stereotypes and foster a gender-inclusive innovation ecosystem through targeted discussions and brainstorming around key traits and skills needed to empower women in the digital age.

4 COMMUNICATING GENDER EQUALITY

The communication and dissemination activities of the EQUALS-EU project offered a valuable experience on the challenges and opportunities related to the promotion of gender equality. The project partners considered language and communication as two important mediums to overcome gender bias and inequalities.

“Gender-sensitive communication ensures that women and men – and those who do not conform to the binary gender system – are treated as persons of equal importance and dignity.” The Gender-sensitive communication toolkit of the European Institute for Gender Equality lists the following three key principles to be followed for achieving an inclusive and transformative language:

- Recognise and challenge stereotypes
- Be inclusive and avoid omission and making others invisible
- Be respectful and avoid trivialisation and subordination.

In this respect, the UN Guidelines for gender-inclusive language is one of the key sources for communication gender equality. The guidelines are based on three best practices: using non-discriminatory language, making gender visible when it is relevant for communication and not making gender visible when it is not relevant for communication.

The EQUALS-EU partners are embracing these principles and aims from European and international initiatives and policies by:

- “Every idea matters”: The recruitment experience for hackathons and innovation camps revealed that some potential participants feel overwhelmed with the word “innovation” and did not feel enough skilled or knowledgeable to participate in these events. To overcome this barrier, it is important to highlight that such events are “open to all regardless of skills, knowledge and abilities” and that “every idea matters”.

- “Good diversity is collective intelligence”: The workshop participants representing the entrepreneurship and investment fields highlighted the importance of transmitting the message to the entrepreneurs and investors that “We can build great gender-inclusive companies that are also good for business.”

- “Diversity doesn’t equal inclusion”: It was also highlighted that diversity does not always lead to inclusivity and it is important to make everyone welcome by giving them space.

- “Context matters”: The workshop participants highlighted that contextual differences should be always kept in mind in communication and dissemination actions regarding gender equality. This had been identified earlier in the project and has resulted in an additional project outcome: the development and dissemination of a lexicon of gender-related words, localised for different regions. Besides this, it is important to note that gender equality falls under different policies and frameworks in different countries (women empowerment, women representation, vulnerable groups etc). Some participants also highlighted that the use of words such as “empowerment”

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18 EQUALS Global Partnership: https://www.equalsintech.org
19 EQUALS-EU, D4.1 Perceptions of Power: Championing Female Leadership in the Digital Age Colloquium report, prepared by T. Dancheva, Dr. A. Ozgur Keysan, Dr. N. Lewis, and Dr. Y. Zhao: https://equals-eu.org/wp-content/uploads/2022/01/WP4_D4.1_EQUALS-EU_Colloquium_Report.pdf
22 EQUALS-EU, D5.1 EQUALS-EU Communication and Dissemination Plan - December 2022 Update, ALL DIGITAL.: https://all-digital.org/
and “engagement” were more effective towards their audiences than “gender” and “inclusivity”. They also highlighted that “digital” and “technology” words should be used more frequently to effectively transmit the project’s messages.

Considering the importance of contextual differences in communicating gender equality, the EQUALS-EU project decided to develop a Lexicon of Gender Equality Words as an additional output of the project to share this experience with others.

5 ALL DIGITAL: ENHANCING DIGITAL COMPETENCES ACROSS EUROPE AND BEYOND

EQUALS-EU project’s communication and dissemination partner, ALL DIGITAL is a pan-European network based in Brussels, Belgium, and represents educational organisations providing training activities to enhance digital competences across Europe and beyond. The ALL DIGITAL network believes that every European should be able to exploit the benefits and opportunities created by digital transformation and its members provide training and support to 1.5 million people every year.

Organisations working for enhancing digital skills such as ALL DIGITAL have a key role to play in digital inclusion considering that the current indicators on Europe’s digital performance show that almost half of the Europeans lack sufficient digital literacy to tackle the new challenges of the digital transformation. And the EU aims for 80% of EU citizens aged 16-74 years old to have at least basic digital skills by 2030.

ALL DIGITAL has a series of flagship initiatives to lead its network and stakeholders towards this target:

- **ALL DIGITAL Summit**: The annual conference-based meeting point of education stakeholders and organisations, policy makers, libraries and digital competence centres that empower citizens across Europe. It is a unique opportunity for the European digital inclusion sector to present achievements and exchange ideas with policy makers at EU and national level, academics, young people, digital skills trainers, and private companies among other stakeholders.

- **ALL DIGITAL Weeks**: An annual online and face-to-face digital inclusion and empowerment campaign run at digital competence centres, libraries, community centres, schools, and other venues across Europe. Every year it helps 100,000 Europeans to learn and be inspired by what digital can mean in their everyday life and linking the policy level to everyone.

- **ALL DIGITAL Awards**: An award programme to celebrate the individuals and organisations across Europe that enable citizens to transform and enrich their lives through the benefits and opportunities created by digital technologies.

- **ALL DIGITAL ACADEMY**: A platform to support and empower adult learning trainers and centres across Europe, in the provision of basic digital skills and competences, specifically the knowledge and understanding of key emerging digital technologies, such as AI and IoT, and related issues, such as data literacy, privacy and protection.

Besides, EQUALS-EU, ALL DIGITAL also participates in a wide range of EU-funded projects to enhance digital competences and foster digital inclusion. Among them are RAYUELA: Empowering Young People on Cybercrime Threats Through Playing, AMELIE: Advanced Media Literacy Education to Counter Online Hate-speech, ACTIon: Promoting Active Citizenship Through Civic Education and Active Online

23 https://all-digital.org/
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29 https://alldigitalacademy.eu
30 https://all-digital.org/projects/rayuela/
31 https://all-digital.org/projects/amelie/
Participation of Youth Role Models and DIGI-BREAKER PLUS: Breaking Barriers and Building Community for an Effective, Sustainable and Inclusive Digitalization of Adult Guidance Services.

The Covid-19 pandemic showed how much the use of digital competences are essential to how we live, learn and work. We are just at the beginning of an epochal transformation of our society, whose digital component has already proven to be transversally relevant in all its sectors. ALL DIGITAL aspires to take advantage of such a unique opportunity by shaping digital transformation with impactful digital education interventions towards a greener, more inclusive, and cohesive Europe.

REFERENCES


32 https://all-digital.org/projects/action/