UNWOMAN

ROTAMUN'25

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LETTER FROM SECRETARY GENERAL

Dear participants of ROTAMUN
On behalf of ROTAMUN Secretariat team it is my honor to welcome you all to our very first ROTAMUN conference and we are so proud to make this dream happen.
My name is Damla AKKAYA a junior student in Rota … I will be serving as your Secretary-General for our first ROTAMUN conference.

ROTAMUN's mission is to provide education and training services to all students with the aim of raising individuals who are committed to the fundamental principles of the Republic of Turkey, have internalized Atatürk's principles and reforms, are aware of national and universal values, respectful, proficient in their native language, fluent in foreign languages, guided by reason and science, aspiring for a better world, following technological advancements, environmentally conscious, and engaged in sports and the arts. With this mission, our main purpose in preparing this conference, simulating debate atmosphere, discussing the latest events and taking little steps for solving critical global issues by prioritizing equity, diplomacy, peace and creativity.
Although it is our first MUN conference I'm sure that ROTAMUN will provide a unique and pleasant experience to all of you.
If you happen to have any problems, feel free to contact any member of the academic team.

Sincerely yours,

Damla akkaya
Secratary General

1.Letter From The Under-Secretary-General
Dear delegates,
I would like to welcome you all to the first official Izmir Rota College Model United Nations Conference 2025 and our committee UNWOMEN. I am Elif Irmak Özfırat, the Under-Secretary-General responsible for this committee. I am a sophomore at Gaziemir Uğur College, and this is my second year in my MUN journey. I am extremely excited to meet and conduct this committee with all of you, and I can't stop mentioning this will be my first time as an USG so this time will have a special place in my heart. Reading this study guide will ensure your complete understanding
of this agenda item: "Supporting Women in STEM: Closing the Gender Gap in Science, Technology, Engineering, and Mathematics", and give you the necessary ideas as to what you should talk about in order to conclude the committee. I highly recommend you pay attention to this study guide before the conference. As a women who is interested in STEM fields, this agenda is very important for me -as I'm reasoning so is for you- and I am looking forward to listening your opinions and points upon it. Additional research, especially about your allocated country, will also be to your advantage. Make sure to come prepared! If you need guidance or have any questions, please never hesitate to contact me or our team. I wish all of you an enjoyable three days in this amazing conference and the continuation of your MUN journey. Good luck!
Sincerely,
Elif Irmak Özfırat
ozfirate@gmail.com

2.Introduction to the Committee: UNWOMEN

2.1.Historical Background of the Committee

The United Nations has faced numerous difficulties and obstacles in its efforts to promote and establish gender equality worldwide. Due to its extensive agenda, addressing this issue has sometimes been seen as a burden. However, gender equality remained too significant to ignore. As a result, the United Nations General Assembly established UN Women in July 2010 as an entity dedicated to advancing gender equality. In addition to this goal, UN Women also focuses on issues such as inadequate funding and the empowerment of women. UN Women aims to make a greater impact on women's lives globally and create a gender-equal world with the support of member states, other UN bodies, and non-governmental organizations (NGOs). Since its creation, UN Women has made significant progress and achieved major successes through initiatives such as the Division for the Advancement of Women (DAW), the International Research and Training Institute for the Advancement of Women (INSTRAW), the Office of the Special Adviser on Gender Issues and Advancement of Women (OSAGI), and the United Nations Development Fund for Women (UNIFEM). Established in January 2006, the UN Women Committee originated from Resolution A/64/588, initially known as the Comprehensive Proposal for the Composite Entity for Gender Equality and the Empowerment of Women. This resolution reinforced the importance and relevance of the United Nations' intervention in achieving a specific goal: promoting the social and economic equality of women and girls worldwide. For many years, the UN faced significant challenges in promoting gender equality, including insufficient funding and the absence of a single, recognized entity to lead its gender equality initiatives. In July 2010, the UN General Assembly created UN Women to address these challenges.

This entity operates at a national level, with an Executive Board as its governing body to provide intergovernmental support and oversee its functions and activities. Through this initiative, UN Member States took a historic step toward accelerating the organization's goals for gender equality and women's empowerment. The establishment of UN Women was part of a broader UN reform agenda, consolidating resources and mandates for greater impact.

2.2.General Information About the Committee

UN Women is the United Nations entity dedicated to gender equality and the empowerment of women. A global champion for women and girls, UN Women was established to accelerate progress on meeting their needs worldwide.

UN Women supports UN Member States as they set global standards for achieving gender equality, and works with governments and civil society to design laws, policies, programmes and services needed to ensure that the standards are effectively implemented and truly benefit women and girls worldwide. It works globally to make the vision of the Sustainable Development Goals a reality for women and girls and stands behind women's equal participation in all aspects of life, focusing on four strategic priorities:

- Women lead, participate in and benefit equally from governance systems
- Women have income security, decent work and economic autonomy
- All women and girls live a life free from all forms of violence
- Women and girls contribute to and have greater influence in building sustainable peace and resilience, and benefit equally from the prevention of natural disasters and conflicts and humanitarian action

UN Women also coordinates and promotes the UN system's work in advancing gender equality, and in all deliberations and agreements linked to the 2030 Agenda. The entity works to position gender equality as fundamental to the Sustainable Development Goals, and a more inclusive world.

Gender equality is not only a basic human right, but its achievement has enormous socioeconomic ramifications. Empowering women fuels thriving economies, spurring productivity and growth. Yet gender inequalities remain deeply entrenched in every society. Women lack access to decent work and face occupational segregation and gender wage gaps. They are too often denied access to basic education and health care. Women in all parts of the world suffer violence and discrimination. They are under-represented in political and economic decisionmaking processes.

Over many decades, the United Nations has made significant progress in advancing gender equality, including through landmark agreements such as the Beijing Declaration and Platform for Action and the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW).

Working for the empowerment and rights of women and girls globally, UN Women's main roles are:

- To support inter-governmental bodies, such as the Commission on the Status of Women, in their formulation of policies, global standards and norms.
- To help Member States implement these standards, standing ready to provide suitable technical and financial support to those countries that request it, and to forge effective partnerships with civil society.
- To lead and coordinate the UN system's work on gender equality, as well as promote accountability, including through regular monitoring of system-wide progress.

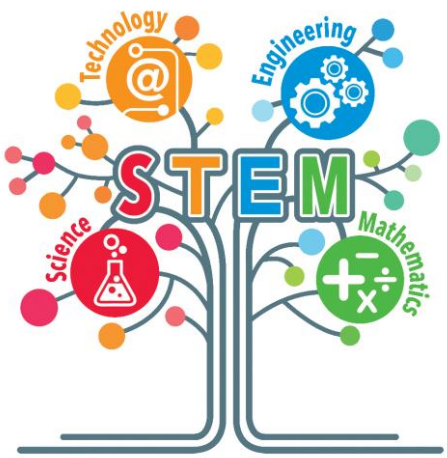
For many years, the United Nations faced serious challenges in its efforts to promote gender equality globally, including inadequate funding and no single recognized driver to direct UN activities on gender equality issues. In July 2010, the United Nations General Assembly created UN Women, the United Nations Entity for Gender Equality and the Empowerment of Women, to address such challenges. In doing so, UN Member States took an historic step in accelerating the Organization's goals on gender equality and the empowerment of women. The creation of UN Women came about as part of the UN reform agenda, bringing together resources and mandates for greater impact. It merges and builds on the important work of four previously distinct parts of the UN system, which focused exclusively on gender equality and women's empowerment:

Division for the Advancement of Women (DAW)
International Research and Training Institute for the Advancement of Women (INSTRAW)
Office of the Special Adviser on Gender Issues and Advancement of Women (OSAGI)
United Nations Development Fund for Women (UNIFEM)

3.What is STEM: Science, Technology, Engineering and Mathematics

STEM is an interdisciplinary approach to education and careers that combines Science, Technology, Engineering and Mathematics. These four core areas are critical to the development of the modern world and are intertwined with each other. The aim of STEM is to equip students and professionals with problem-solving skills to make them the scientists, engineers and innovators of the future. In this context, STEM education encourages hands-on and experiential learning rather than theoretical knowledge. Students learn abstract concepts by relating them to real-world problems and produce creative solutions using engineering design processes. Scientific methods, technology tools, engineering principles and mathematical thinking are the cornerstones of STEM. The concept of STEM emerged in the United States in the late 20th century. In 1957, the Soviet Union's sending the Sputnik 1 satellite into space encouraged the US to become stronger in the field of science and technology. During this period, NASA and other scientific organisations started to pay more attention to mathematics and engineering education. In the 21st century, STEM is not limited to space sciences,

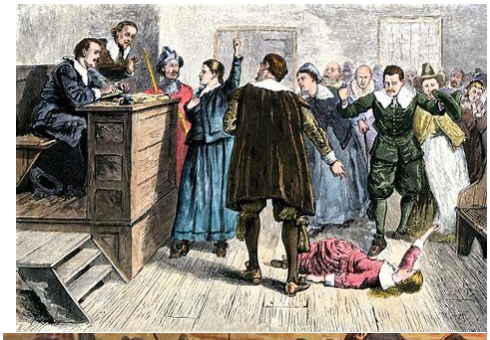
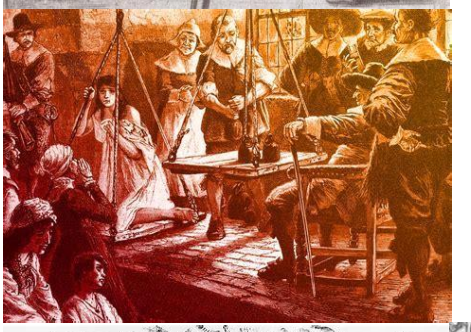
but has grown to include many modern fields such as biotechnology, artificial intelligence, environmental science, data science. Especially since the 2000s, STEM education has become widespread worldwide, and many countries have encouraged STEM programmes to strengthen their economies based on science and technology. Today, STEM education has started to be taught in schools from primary school level and has been at the centre of advanced research in universities. The goals of STEM are not only to make individuals achieve academic success, but also to make them individuals who are sensitive to the needs of the society and the world they live in and who can produce solutions. This educational approach aims to enable students to analyse the problems they face with scientific methods, develop creative solutions by using technology effectively and structure these solutions from an engineering perspective. In addition, thanks to STEM education, individuals not only contribute to their personal development, but also have the potential to produce sustainable solutions to global problems such as environment, health, energy and transport. One of the long-term goals of STEM is to increase the competitiveness of countries in science and technology by increasing the number of individuals trained in this field. It is also an important goal to increase access to STEM, especially for women and individuals from different socio-economic groups, and to provide equal opportunities. The skills that STEM education provides to individuals largely overlap with the basic competences of the 21st century. Through this educational approach, students are equipped not only with theoretical knowledge but also with skills such as problem solving, critical thinking, creativity and innovation. STEM encourages individuals to look at a problem from different perspectives, think systematically and develop solutions. Technological literacy, effective use of digital tools and basic coding knowledge are also important parts of STEM education. In addition, students are equipped with skills such as mathematical thinking, data analysis and numerical literacy. Social skills such as group work, communication, co-operation and project management are among the competences that are frequently developed in STEM projects. All these skills contribute to the success of students not only in their educational lives but also in their business and social lives. STEM is not a narrow field that addresses only a certain age group or profession; on the contrary, it is a universal approach that addresses a very wide audience. Individuals of all age groups from primary school to university and even professional life can benefit from STEM education. This education model keeps students' curiosity about nature alive at a young age and encourages them to think scientifically, while giving them the ability to develop interdisciplinary solutions to more complex problems at an advanced age. Many professional groups such as academics, researchers, engineers, software developers, doctors, environmental scientists, entrepreneurs actively use STEM skills. In addition, STEM is not limited to technical professions; it also contributes to the emergence of more inclusive and innovative ideas when integrated with social sciences. Today, the inclusiveness of STEM is also supported by policies aimed at ensuring that students from different socioeconomic levels and all individuals, regardless of gender, have equal opportunities in this field. In this respect, STEM stands out as a powerful model that aims not only individual success but also social progress.

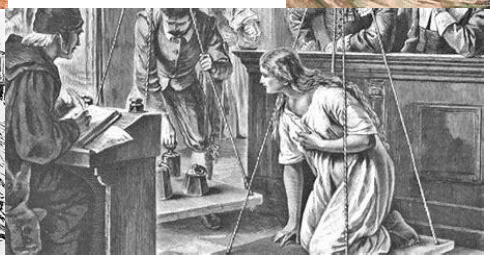


- **Past History of Women in STEM Fields**

Even though the STEM concept is a 20th century's concept, the STEM fields had already been existing long way before the STEM concept itself. Which means that science, technology, engineering and mathematics have been a part of the world for hundreds of years and all that history comes with past experiences, challenges and results. Human race have been experiencing all these majors since the universe was created, and as UNWOMEN's field of interest ,which leads us to women, it means women have been a part of these experiences and researches all way long. But as the history and today's world shows us, women are not in a place of comfort or convenience while executing their fields of interest or work. Men were supported in past, in many ways in STEM fields such as economic, mental, physical, educational systems. In times not so distant from today, people and societies were condemned to the belief that men were superior and that they should dominate in important areas, and that women were objects that glorified the existence and deeds of men who supported their husbands and fathers from their houses. Men were born, got into society, picked their fields of interest and made significant processes in the areas that they picked. They were supported to go to colleges, get into laboratories and make history while women were told they can not get education, improve themselves or even do something unusual for a lady whose job is to please the men kind and deal with feminine stuff. -Thinking today, even defining science as 'masculine' is a whole nonsense itself.- However, how much the society tells you to make your cup of teas and read your magazines it can not stop you from executing your passion or curiosity. That pretty much explains the history of women in STEM fields. In other words, it can be said that throughout history, humanity has been engaged in scientific endeavours to reach knowledge, understand nature and improve the quality of life. However, the subject of this endeavour has generally been men, while women have been excluded from science for many centuries. The darkest manifestation of the social, religious and cultural barriers that prevented women from receiving education, engaging in scientific research and thinking freely was experienced during the witch hunts. This was a period when the pursuit of scientific knowledge, especially for women, became so dangerous that it could be paid for with life.

- **Witch Hunts and the Suppression of Women in Science**

Witch hunts intensified in Europe between the late 15th and early 18th centuries, especially in a period when religious bigotry was at its peak and social transformations led to fear and chaos. Religious reforms, wars, disasters such as plague epidemics and famine caused society to look for scapegoats, and women were especially targeted in this process. One of the most effective ideological tools of the period was Malleus Maleficarum (Meaning: Witches' Hammer), written by Heinrich Kramer and Jacob Sprenger in 1487. This book describes women as being more prone to the devil by nature and explains on ‘theological’ grounds why women should be targeted more in accusations of witchcraft. One statement in the book is quite remarkable:

‘Woman takes her name from ‘deficiency’. She is weaker than man, both in body and mind.’

This mentality led to the unquestioning torture of hundreds of thousands of women and the burning alive of thousands more. According to Brian P. Levack's research, approximately 60,000 people were killed in Europe during this period, and more than 100,000 people in total were accused of witchcraft, 75% of whom were women (Levack, 2006). Especially in regions such as Germany, Switzerland and Scotland, witch hunts were more intense. In the sociopolitical atmosphere of the period, the fact that women were engaged in scientific knowledge, were in touch with nature, especially in rural areas, and developed herbal treatment methods was enough for them to be stigmatised as ‘witches’. Women were seen as a threat by the male-dominated medical world and the church because they facilitated childbirth, treated patients with herbs and enlightened their environment with intuitive knowledge. As noted in Ehrenreich and English's (1973) feminist history, women healers were penalised not only for producing knowledge but also for challenging the professional authority of male doctors. As male-dominated professional groups gained power in medieval Europe, women's role in public health was deliberately suppressed. While modern medicine was on the rise, women were labelled as ‘primitive’ and their sources of knowledge were portrayed as ‘demonic’. Despite all these pressures, there have been women who have endeavoured to access knowledge even in the dark periods of history. Their

names may not have been recognised in their time, but their influence left a lasting mark on the history of science. A few examples of these women:

Hildegard von Bingen (1098-1179): A Catholic nun, Hildegard was also a woman of science. Her works on the medicinal use of plants formed the basis of medieval folk medicine. She was also a composer, writer and astronomer. She was one of the rare women who could develop independent thought even in the shadow of religious authorities.

Trotula of Salerno (11th century): One of the earliest female physicians of the Middle Ages. Her texts on gynaecology, obstetrics and hygiene were taught for centuries at the Salerno School of Medicine.

Émilie du Châtelet (1706-1749): French mathematician and physicist. He filled a major gap in the scientific world by translating Newton's Principia Mathematica into French. He contributed to modern physics with his early ideas on the law of conservation of energy.

Caroline Herschel (1750-1848): Together with her brother William Herschel, she studied the sky, discovered 8 comets and won the first woman astronomy award. She was the first woman scientist to be honoured by the Royal Astronomical Society.

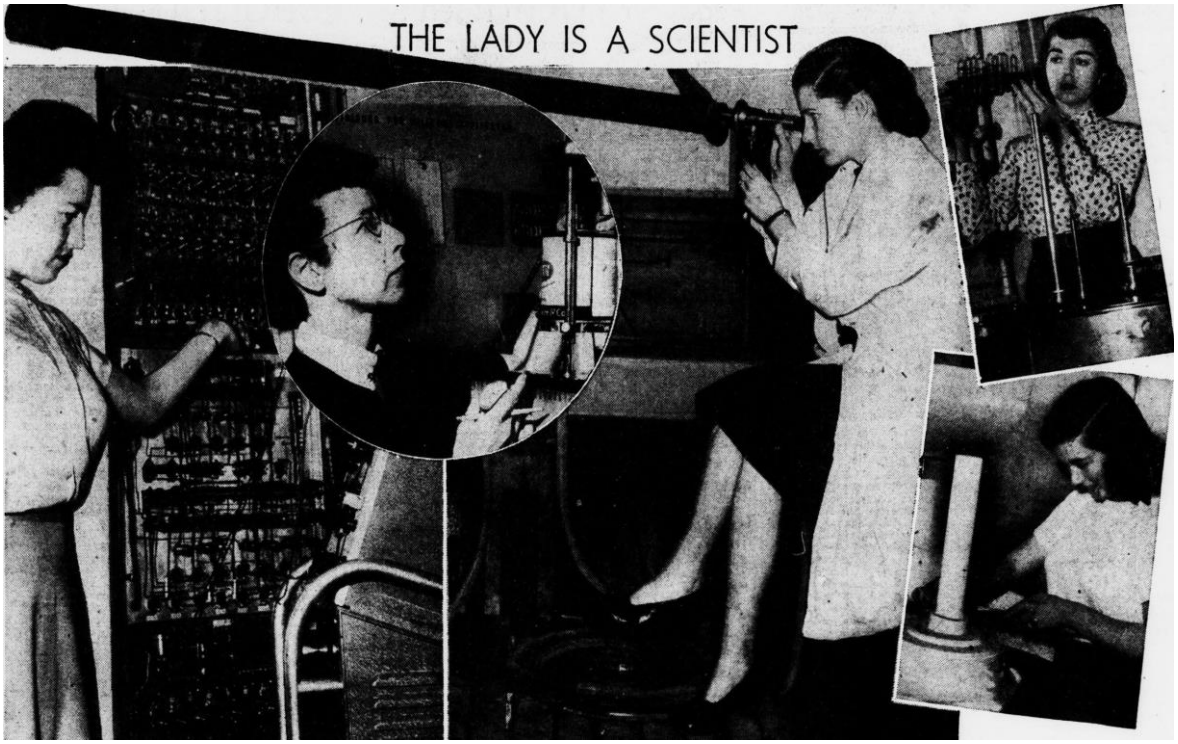
Marie-Anne Lavoisier (1758-1836): Although she was the wife of Antoine Lavoisier, the father of modern chemistry, she was his translator, experimental assistant and scientific interpreter. She is one of the first female figures in chemistry laboratories.

- **Where are Women in Science?**

Until the early 20th century, women's visibility in science was extremely limited. Many women scientists had to publish their discoveries under the names of their male colleagues. Many achievements in the history of science have been attributed to men even though they belong to women. One of the most well-known examples of this is Rosalind Franklin, who discovered the structure of DNA. Franklin's ‘Photograph 51’ formed the basis of the work for which Watson and Crick won the Nobel Prize; however, Franklin was never officially recognised. Even today, women in science still struggle with gender inequality. However, the past should be remembered and this struggle should be seen as the voice of those who have been ‘silenced’ in the history of science. The witch hunts tried to destroy not only the lives of women, but also their scientific potential. However, what remains from this period is not only ashes, but also resistance. The desire for knowledge is an unstoppable instinct. Women have been silenced for centuries, but these attempts to silence them have led to a stronger voice for scientific thought and women. If the presence of women in science today is more visible than ever, it is due to the resistant women of the past.

- **The Role of Women in STEM**

In STEM fields (science, technology, engineering, and mathematics), one of the most significant obstacles that remain is gender disparity. Women are disproportionately underrepresented in STEM disciplines, according to research and statistical statistics. In comparison to men, women comprise a lesser share of the STEM workforce and are less inclined to pursue STEM-related degrees and jobs. A major detrimental impact on STEM creativity and diversity is caused by this mismatch, which narrows the spectrum of perspectives, approaches, and techniques for problem-solving. Varied ideas and solutions are more likely to be generated by a more varied STEM community, which would hasten the growth of science and technology. Diversity is crucial for fostering creativity. Girls in STEM education are crucial because they not only foster diversity and creativity but also serve as important role models for future professionals. Their efforts serve as a catalyst for inventions that



upend whole industries and pave the way for future generations. From the ground-breaking discoveries made by Marie Curie to the achievements of contemporary female scientists, engineers, and technicians, girls in STEM have always improved the field with their knowledge, ingenuity, and perspectives. In this regard, female participation is currently a major factor influencing the development of STEM fields and STEM education. Prejudices and cultural views significantly influence the number of girls who engage in and are represented in STEM disciplines, as STEM education makes abundantly evident. Girls face barriers in STEM education due to cultural biases and assumptions that STEM fields are better suited for men. The lack of information regarding mentors and role models in STEM fields exacerbates the under-representation of girls in these fields. Addressing the issue requires initiatives that promote STEM education for girls and inspire them to pursue careers in the field. We can challenge societal norms and provide supportive conditions to help females flourish in STEM and reduce the gender gap. There are several significant reasons why girls in STEM fields are crucial. Diverse teams—including girls in STEM fields—may approach challenges from many angles, which fosters more original thinking and improved problem-solving. Girls' encouragement to pursue STEM careers helps build a robust and competitive labor force, which in turn propels economic growth by filling the growing need for skilled workers. Equal opportunities in STEM disciplines contribute to the development of a just and equitable society where everyone has the potential to prosper by promoting social justice and shattering gender stereotypes. Future generations of girls are inspired to pursue STEM fields by female role models, which creates a positive feedback cycle of success and motivation. Girls bring original thoughts and imaginative methods to the table, which results in ground-breaking discoveries and innovations that promote society. Girls must be encouraged to pursue STEM fields, and a diverse and representative workforce must be created if we are to guarantee that STEM advancements meet the needs of all people. Women in STEM make social and cultural changes that support and encourage girls to pursue STEM areas from an early age by challenging traditional gender conventions. A few of the most significant worldwide issues, like healthcare, climate change, and sustainable development, may also be helped by girls pursuing STEM fields. In conclusion, females in STEM professions and high-quality STEM education are essential for fostering innovation, expanding diversity, accelerating economic growth, and ensuring a more inclusive and fair future. One of the biggest problems that still exists in the

STEM professions is the gender gap. Research and statistics constantly show that there is a lack of female representation in STEM fields. Women are underrepresented in the STEM workforce and are less likely than men to pursue degrees and careers in the field. This mismatch has a negative impact on diversity and innovation in STEM domains by reducing the range of viewpoints, methods, and problem-solving strategies available. Diversity encourages creativity, and a more diverse STEM community would generate a wider range of concepts and solutions, accelerating the advancement of science and technology. Moreover, these disparities perpetuate stereotypes and biases that restrict women's potential and make it harder for them to excel in STEM professions. It is crucial to address this disparity for the sake of social justice as well as to advance STEM education, especially STEM for girls. For example in İndia, according to the Indian Ministry of Science and Technology report, women continue to outweigh men in India when it comes to the number of people with degrees in science and engineering, with over 30% of female students choosing to study in STEM fields. Still, there remains a gender gap in the field; throughout the nation, women make up just 14% of STEM professionals. These findings highlight the glaring underrepresentation of women in STEM areas in India and highlight the need for concerted initiatives to increase diversity and gender equality in these sectors, with a focus on Girls in STEM and STEM Education for Girls. Women have made significant contributions to STEM fields, often overcoming substantial obstacles and societal biases. In ancient times, Hypatia of Alexandria emerged as a leading mathematician and philosopher, yet her achievements were overshadowed by political and religious conflicts that ultimately led to her tragic death. The Scientific Revolution and Enlightenment periods saw women like Émilie du Châtelet, who translated and expanded upon Newton's work, and Maria Sibylla Merian, who revolutionized the study of insects, yet they were frequently denied access to academic institutions and scientific communities. In the 19th and early 20th centuries, figures such as Ada Lovelace, often recognized as the first computer programmer, and Marie Curie, the only person to win Nobel Prizes in two different scientific fields, defied societal expectations to make lasting impacts in mathematics, physics, and chemistry. However, many women's contributions were either diminished or credited to their male counterparts, as seen in the cases of Lise Meitner, who co-discovered nuclear fission but was denied the Nobel Prize, and Rosalind Franklin, whose crucial work on DNA structure was largely attributed to Watson and Crick. During World War II, women were instrumental in computing and engineering, with Hedy Lamarr co-inventing frequency-hopping technology—an innovation that laid the groundwork for modern wireless communication—though her work went unrecognized for decades. In the space race, mathematicians like Katherine Johnson, Dorothy Vaughan, and Mary Jackson played critical roles in NASA's success despite facing racial and gender discrimination.

While the latter half of the 20th century saw progress with trailblazers like Sally Ride, the first American woman in space, and Mae Jemison, the first African-American woman in space, women in STEM today continue to encounter challenges, including the gender pay gap, underrepresentation in leadership, and systemic biases. However, initiatives such as Girls Who Code, Women in Science and Engineering (WISE), and UN Women's STEM programs are actively working to close these gaps, ensuring that future generations of women can thrive in science, technology, engineering, and mathematics without the barriers of the past.

- **Important Women Role Models in STEM**

Investing in the development and promotion of female role models in STEM is not only about individual success—it is about transforming the landscape of the entire field. As more women step into leadership roles and share their expertise, they pave the way for a more diverse, dynamic, and innovative community. This ripple effect has the potential to drive significant advancements in research, technology, and industry. By ensuring that young women have access to the support, resources, and role models they need, we contribute to a future where talent and creativity are the

cornerstones of progress. Every time a young woman sees a successful role model in STEM, she is more likely to believe that she too can overcome challenges and contribute to transformative solutions. The impact of female role models in STEM goes beyond inspiring individual careers—it contributes to the creation of a more inclusive and dynamic professional community. So here are some examples of these successful women role models in STEM:

Marie Curie (1867–1934) – Physicist and Chemist

Marie Curie is generally regarded as one of the greatest scientists of all time, not only because of her remarkable achievements but also because of her enduring legacy in opening doors for women in science. She was the first woman Nobel laureate, and to date the sole individual to have received two Nobel Prizes in two separate scientific fields: Physics (1903) and Chemistry (1911). Her pioneering research in radioactivity—she actually defined the term—led to the discovery of elements polonium and radium. In an era when women were mostly excluded from academia and scientific communities, Curie was not deterred by institutional obstacles with unwavering determination. Beyond the lab, she established mobile X-ray units during World War I that treated thousands of wounded soldiers. Her story remains an inspiration, embodying courage, intelligence, and integrity, showing that brilliance knows no gender.

Grace Hopper (1906–1992) – Computer Scientist and Rear Admiral

Grace Hopper was a remarkable computer scientist and a high-ranking officer in the United States Navy whose contributions cemented the face of technology yet to come. Nicknamed "Amazing Grace," she invented the first compiler, a program which translates written word into computer codes—an innovation which opened the path to contemporary computer programming languages. She was a key developer of COBOL, a program language used on mission-critical systems today. Hopper was not only a technical pioneer but also a brave leader who envisioned user-friendly computing. Her military service, concluding at the level of Rear Admiral, was an indication of her commitment to excellence and service. She often spoke about the importance of innovation and risk-taking, famously saying, “The most dangerous phrase in the language is, ‘We’ve always done it this way.’” Her legacy continues to inspire women to lead in both technological and military fields.

Mae Jemison (1956–) – Astronaut and Physician

Dr. Mae Jemison is a physician, engineer, and former NASA astronaut who shattered glass ceilings by becoming the first African American female to travel into space in 1992. She is a woman of remarkable versatility and holds degrees in African-American studies and chemical engineering, and a medical degree from Cornell University. Before she became a NASA astronaut, she was a medical officer for the Peace Corps, providing healthcare across West Africa. In her historic flight aboard the Space Shuttle Endeavour, Jemison conducted scientific experiments and showed the world that space

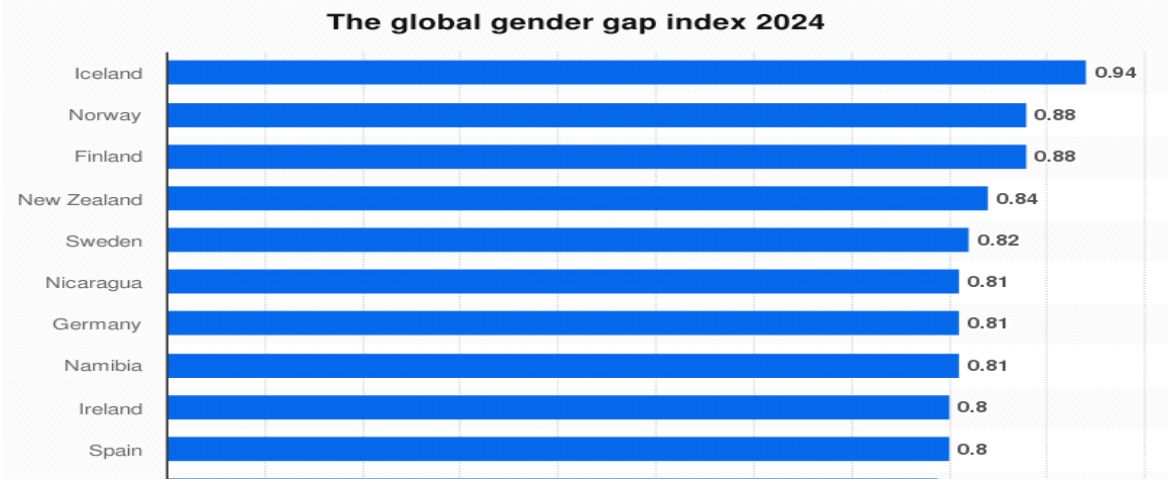
travel is for everybody. She has further set up various organizations aimed at science education and technological innovation in underrepresented groups. As a promoter of STEAM (Science, Technology, Engineering, Arts, and Mathematics) education, she strongly believes in making science accessible and inclusive. Jemison's life illustrates how interdisciplinary thinking and compassion can create revolutionary transformation.

June Almeida (1930–2007) – Virologist

June Almeida was a trailblazing Scottish virologist who revolutionized our knowledge of viruses during her lifetime. Almeida, brought up in a poor family and leaving school at 16, built a legendary scientific career with her brains and determination. She was a pioneer in the use of electron microscopy for virus classification and identification. It wasn't until 1964, when she first visualized and identified the human coronavirus—a fact which has very recently become newly popular in response to the pandemic of COVID-19—although at the time her work was in its advanced stages and then discredited only to lead later to modern-day virology. Almeida's story is a perfect example of the power of genius and passion and ability to bypass difficulties even where qualifications are absent. She is a lasting icon of hope for future scientists who do not follow the traditional paths but would like to make basic discoveries themselves.

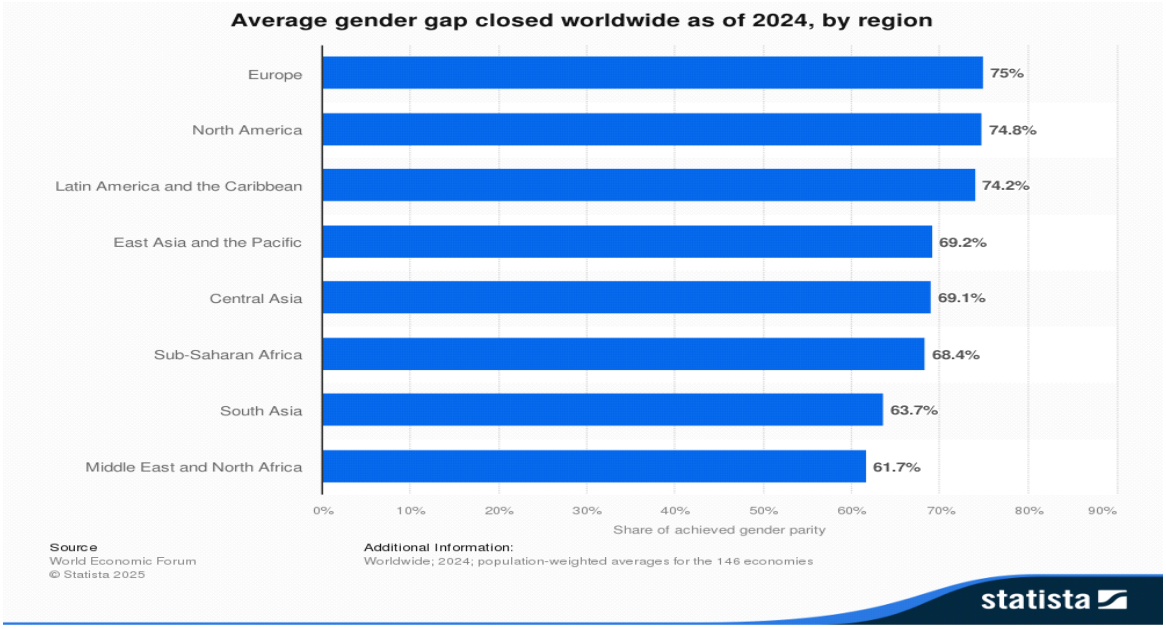
- **What is Gender Gap?**

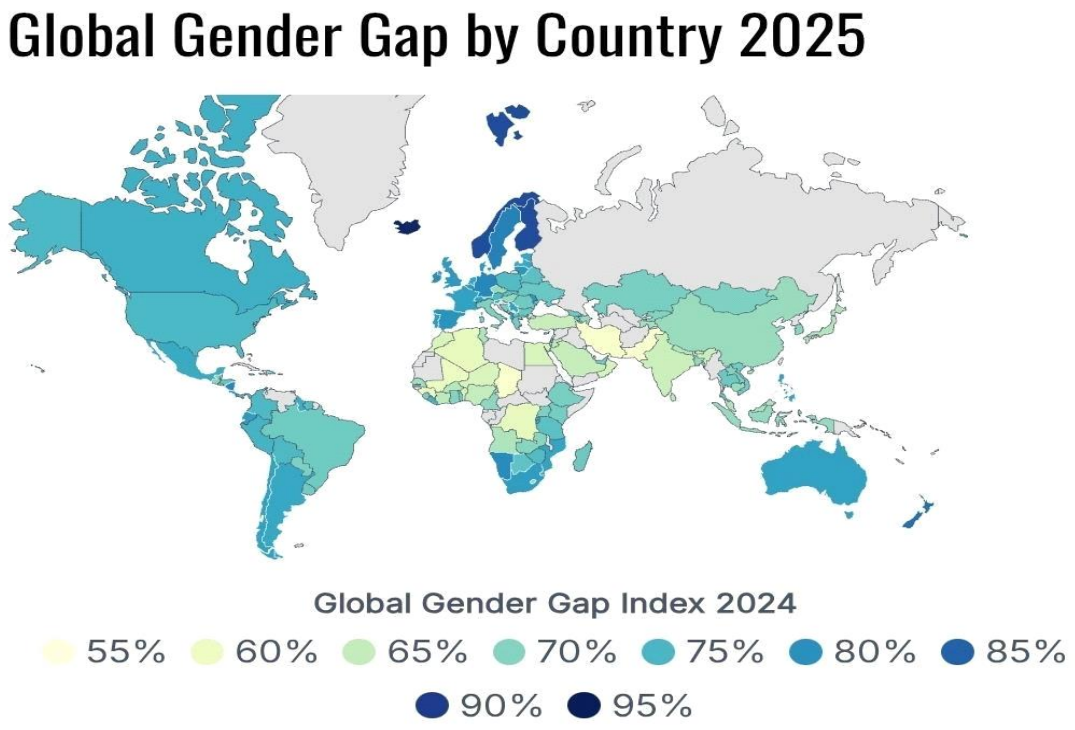
The gender gap is the difference between women and men as reflected in social, political, intellectual, cultural, or economic attainments or attitudes. The Global Gender Gap Index aims to measure this gap in four key areas: health, education, economics and politics. So the gap in economics, for example, is the difference between men and women when it comes to salaries, the number of leaders and participation in the workplace. Education encompasses access to basic and higher levels of education, while health looks at life expectancy and politics examines the difference between how men and women are represented within decision-making organizations.



9.1. TOP 10 COUNTRIES OF THE GLOBAL GENDER GAP INDEX

Since the report measures these differences irrespective of overall income levels, some relatively poor countries can perform well on the index. Both Namibia and Nicaragua are found in the top 10, for example, showing how these countries distribute their resources and opportunities relatively well. But there is a notable absence of any of the world's leading industrialized nations – the so-called G20 – within the top 10, showing that economic power is not necessarily a recipe for better equality between the sexes. Iceland has been the world's most gender-equal country for nine years, forming part of a trend for Nordic countries to perform especially well. But Pakistan, Yemen, Iran, Saudi Arabia and Syria all landed in the bottom 10 out of the 144 countries scrutinized. On average, the 144 countries in the report have nearly closed the gap in health outcomes and educational attainment. But the gap is still wide open in political and economic participation.





Countries need to pay attention to the gender gap not only because such inequality is inherently unfair. But also because numerous studies suggest greater gender equality leads to better economic performance. The report quotes recent estimates that suggest economic gender parity could add an additional $250 billion to the GDP of the UK, $1,750 billion to that of the US and $2.5 trillion to China's GDP only in 2017. At the current rate of progress the overall global gender gap will take a hundred years to close, while the gap in the workplace will now not be closed for 209 years. It is a gap the world can't afford to ignore. The annual Global Gender Gap Index measures gender gaps in 156 countries around the globe. The rankings are based on the equality of genders across four areas: Economic Participation and Opportunity, Educational Attainment, Political Empowerment, and Health and Survival. The index assigns a score of 0 percent to 100 percent, with 0 being the lowest possible gender equality (and highest gender gap) and 100 being the most significant gender equality (and lowest gender gap). In the 2023 index, Afghanistan has the highest gender gap at 43 percent. The index gives an educational attainment score of 48 percent and an economic opportunity and parity score of 17.6 percent. Pakistan, which borders Afghanistan, has the next-highest gender gap at 56.4 percent. The rest of the bottom five countries are the Democratic Republic of the Congo at 57.5 percent, Iran at 57.6 percent, and Chad at 57.9 percent. The lowest gender gap in 2023 was in Iceland, which has an index of 90.8 percent. Educational opportunities are just about equal for men and women in Iceland, and the economic participation and opportunity score is 80.3 percent. Finland, also in Northern Europe, also has a relatively low gender gap. Its overall score is 86 percent. Nearby Norway has a score of 84.5 percent. Although women and men have about equal educational attainment, Norway's economic participation and opportunity score is only 49.2 percent. New Zealand and Sweden round out the top five countries with the lowest gender gaps. New Zealand scored 84.1 percent on the index, while Sweden scored 82.2 percent. North American countries generally scored in the upper-middle section of the rankings. The United States scored 76.9 percent, Canada scored 77.2 percent, and Mexico scored 76 percent. Costa Rica scored 79 percent, Panama scored 74.3 percent, and Nicaragua scored 80 percent. In the Caribbean, Jamaica scored 74.9, and Barbados, 76.5 percent. South American countries tended toward the lower-middle section of the range. Argentina has the lowest gender gap at 75.6 percent, while Brazil has the highest at 69.6 percent. The scores in African nations varied widely. Rwanda, at 81.1 percent, had the lowest gender gap in Africa. Chad, at 57.9 percent, had the highest.

- **Gender Gap in STEM**

10.1. How Can the Gender Gap in STEM matter?

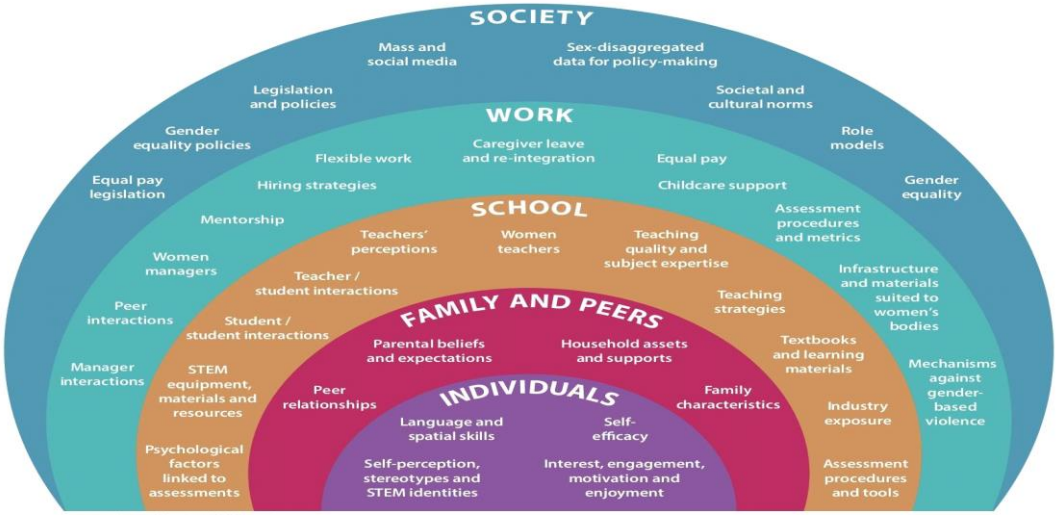
By missing out on half of the world's potential, all of society suffers because our ability to address challenges and take advantage of innovations is undermined. The G20 countries and the international community would benefit from combating gender inequalities to find solutions to common challenges, accelerate the achievement of global goals and advance the fulfilment of the human right to share in scientific advancement and its benefits.A range of gains are provided by diversity, equity and inclusion, including in STEM. Such benefits include the greater innovation of diverse teams and the creation of an adequate STEM workforce with resulting economic potential, among others.2Yet women and girls face persistent gender inequalities in STEM fields, particularly in advanced stages along the career ladder. For instance, women account for just one quarter of students in information communication and technology (ICT), one in three researchers and 10% of Nobel Prize awardees in natural sciences since 2011. Women hold 22% of STEM occupations in G20 countries.

10.2. Why The Gender Gap Exists in STEM?

Multiple and overlapping factors influence girls' and women's participation, achievement and progression in STEM studies and careers, all of which interact in complex ways for girls and women in all their diversity. These factors are present from an early age, creating and perpetuating learned biases. Gender bias, which may be unconscious, creates gendered expectations and gendered

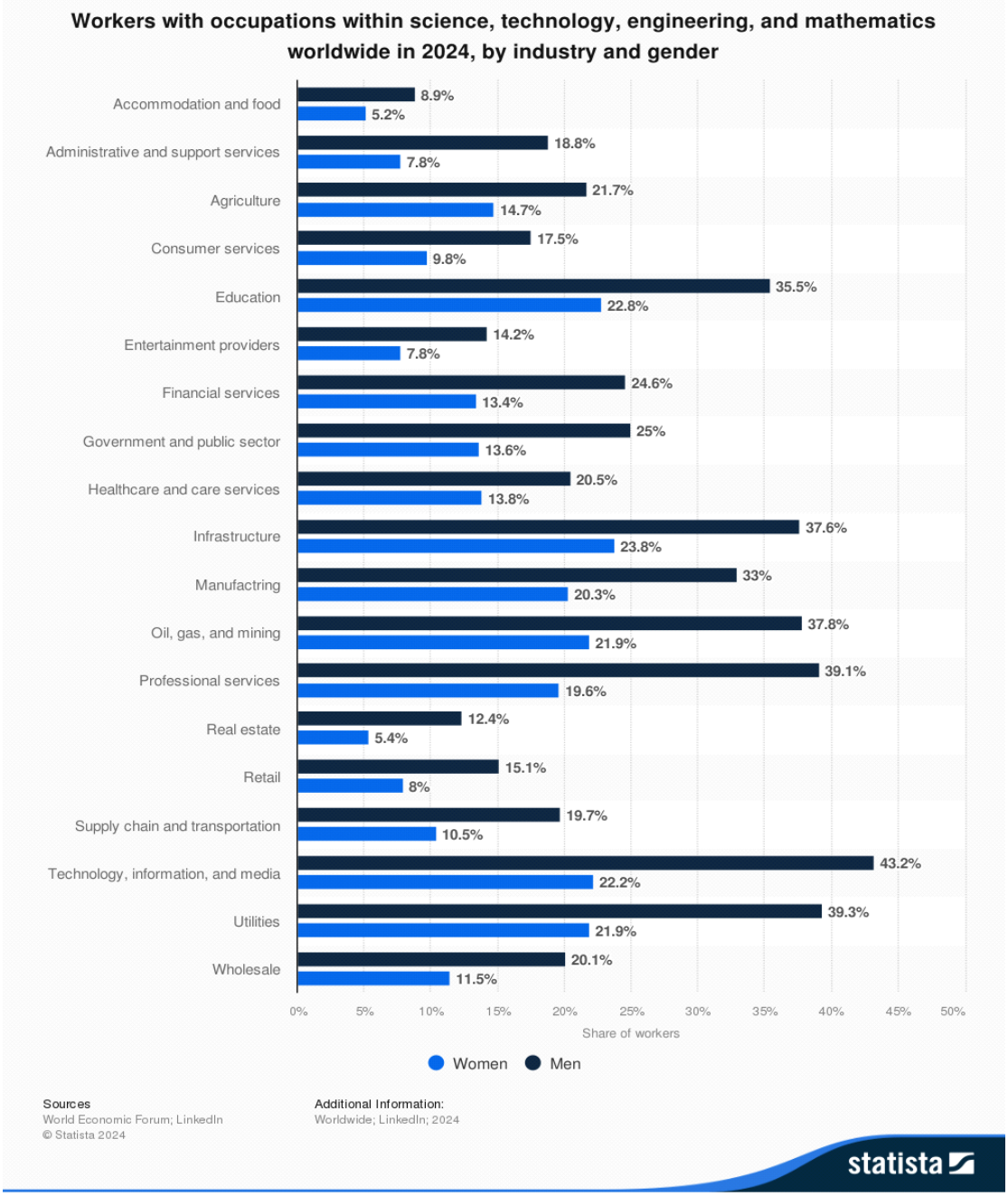
interactions that can shape the motivation, interest and skills development of young children, students and professionals. The picture below sets out a framework of factors at the individual, family, institutional and societal levels, building on the framework in the UNESCO report Cracking the Code.

Framework of factors influencing girls' and women's participation, achievement and progression in STEM



Source: Adapted from UNESCO (2017)

- Individual level: Differences in cognitive ability are more likely to differ among individuals than between girls and boys, women and men. However, individual beliefs, self-perception and experiences do shape STEM-related learning and participation. Self-efficacy affects STEM education outcomes and aspirations for STEM careers, as well as performance. Girls and women who assimilate gender stereotypes have lower levels of self-efficacy and confidence in their ability than boys and men.
- Family and peer level: Gendered parental beliefs and expectations, parental education and socioeconomic status, behaviours by parents, relatives and partners around STEM-related play, learning and working, as well as peer influences impact girls′ and women′s motivation and sense of belonging in STEM.
- School level: Factors within the learning environment – including teachers' profile, experience and gendered beliefs and expectations; curricula, learning materials and resources including the presence of gender stereotypes and bias; teaching strategies and student–teacher interactions; assessment practices and the overall school environment – affect whether or not girls engage in STEM early and women pursue STEM career paths
- Workplace level: Factors within the career environment, including hiring and advancement strategies, parental and caregiver leave, reintegration following family-related career interruptions, childcare support, flexibility of working arrangements, collegial interactions, presence of robust mechanisms for reporting and responding to gender-based harassment and violence, availability of equipment and infrastructure suited to women, gendered remuneration and the overall workplace environment, affect how women enter and experience the STEM workforce.
- Societal level: Social and cultural norms related to gender equality – as well as gender stereotypes in the media – influence girls' and women's perceptions about their abilities, role in society and career and life aspirations. Although policy interventions can influence or compensate for societal factors, many policies are gender-blind or gender-neutral, without mandating or supporting targeted actions or gender-disaggregated monitoring.

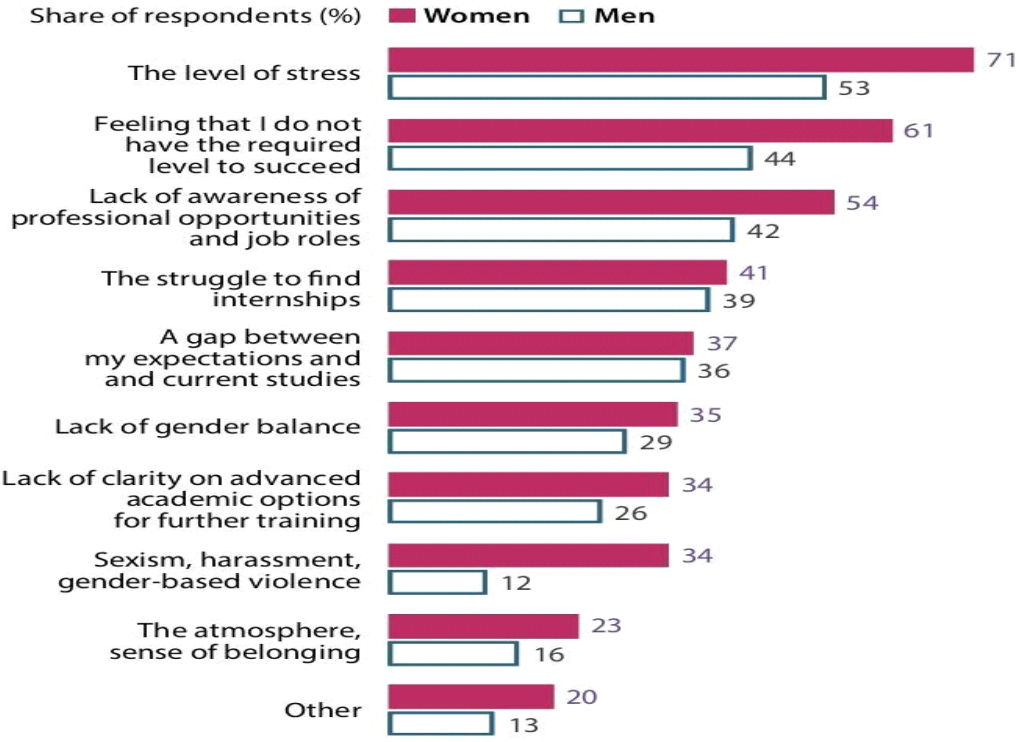


As it is shown in the statics, men are a particularly more number within the STEM fields. The researches has shown that these number and statics are no consequences with specific and various reasons, today, women are still not getting the support and investment that they should get from the society, countires, departments or any workplace with legal instruductions.

- **Challenges That Women Faces in STEM Fields**

Due to many reasons in past and today's world, women have been facing with different issues İN many fields. STEM fields are one of these fields. STEM fields should be an objective, non-sexist and logical atmosphere of radical people. But unfortunately statics shows that women in these fields face challenges, trials, difficult and abusive processes. We talk about these inequalities and injustices when we should be talking about the equality of the whole process, as they should start on an equal level with men. We can address these challenges such as; gender bias and stereotypes, The Matilda Effect, underrepresentation and absence of role models, gender pay gap, workplace harassment and discrimination, lack of support and mentorship, work-life balance pressures, cultural and societal expectations, limited access to leadership and funding opportunities and many more.

TOP CHALLENGES THAT WOMEN AND MEN FACE IN STEM FIELDS



Source: Gender Scan Student Survey 2021[41]

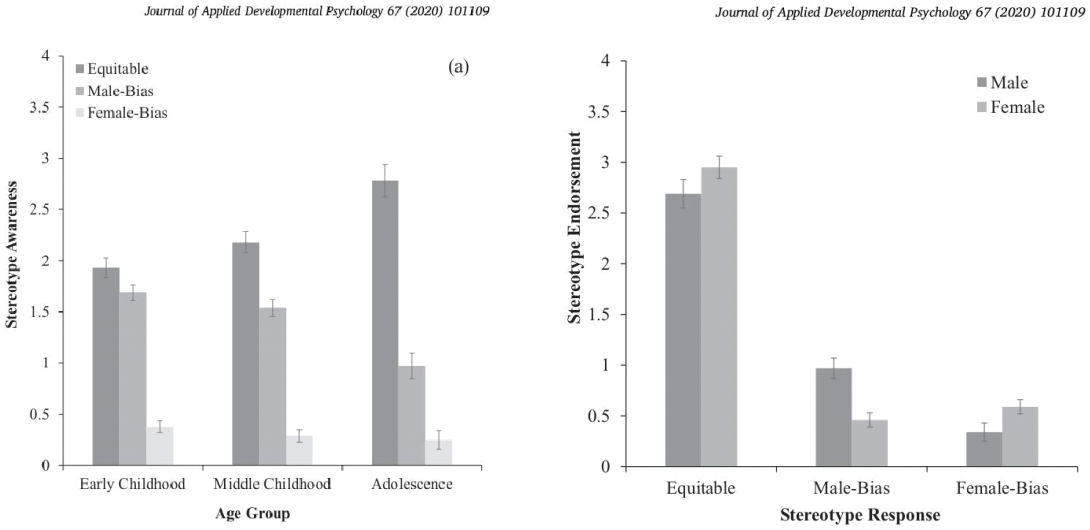
Respondents from G20 countries to Gender Scan's Survey in 2021 shared insights into their perceptions and experiences studying STEM. Both men and women expressed high levels of contentment with their academic choices in STEM fields, with over 60% responding 'yes, absolutely' and another 30% 'yes, rather' when asked if they were satisfied with their choice of study.Feeling useful to society is a significant factor contributing to the satisfaction of STEM students in higher education, particularly among women. The development of new competences and skillswas the most satisfying aspect for STEM students, positively perceived by 9 out of 10 students regardless of gender. Opportunities to work in diversified sectors (87% of women and 82% of men), the intrinsic interest of the studies (87% of women and 77% of men) and the ease of finding a job after graduation (86% of women and 87% of men) were also key satisfaction factors. Overall, men were slightly more likely than women to report feeling fulfilled (85% of women and 86% of men), comfortable (83% of women and 89% of men), settled in (82% of women and 89% of men) and supported (72% of women and 75% of men) in STEM fields. The feeling of being in a competitive environment was more prevalent among women, as approximately half of the women responding (43%) felt this sentiment, in contrast to 28% of men. The lack of gender balance was also identified as a major challenge by 35% of women and 31% of men studying STEM. Another factor of dissatisfaction present in higher rates among women than among men is the feeling of not having the necessary level to succeed. Such fears, part of 'imposter syndrome', were reported by 58% of women studying STEM, climbing up from 39% of men declaring the same feeling. Even more serious, over 40% of women studying STEM reported having been the target of sexist behaviour. Men accorded less impact to sexism, with 7% or fewer of men considering sexism to be stressful, disheartening or leading to lower self esteem. By comparison, 36% of women reported sexism as a top challenge in their STEM studies.

11.1. Gender Bias and Stereotypes

Stereotypes about science, technology, engineering and mathematics (STEM) are associated with reduced STEM engagement amongst girls and women. Gender stereotypes about who can be, should

be and is usually good at science, technology, engineering and mathematics have long-lasting consequences for engagement with and motivation towards STEM domains. These stereotypes emerge in childhood and are reinforced in adolescence by the presence of male teachers in STEM subjects and an imbalanced classroom gender composition. Crucially, these stereotypes persist into the workplace and broader society, making an impact on representation of women in the STEM fields. There is a need to challenge ideas about STEM ability based on gender, which contribute to disparities in gender representation in higher education and employment. For example in 2020, in the UK, women make up only 22% of the STEM workforce and in the US, women make up only 24% of STEM workforce. Ideas about who can succeed in STEM have a powerful influence on the representation of marginalized groups in the science workforce, with such stereotypes leading to women not choosing STEM careers, or leaving the field early. Gendered stereotypes regarding who can succeed in STEM threaten the career choices of women and can help explain why women who do pursue a STEM career may eventually leave their chosen field. Evidence suggests that science ability can be viewed as gender innate; that is, that men are simply "born" to succeed in the STEM world. Such stereotypes have damaging consequences related to women's STEM self-efficacy and career motivation. For example, research with adolescents has demonstrated that STEM stereotypes are a significant predictor of STEM self-efficacy, which in turn predicts future career aspirations. These stereotypes emerge in childhood. Children between three- and five-years-old show less support for counter-stereotypical STEM career choices. Six- to ten-year-old children have been shown to hold the stereotype that math is for boys, with male participants identifying more strongly with math. This is especially concerning in light of meta-analytic evidence that suggests that girls and boys do not, in fact, perform differently in measures of math ability. These stereotypes then are not founded in any real gender performance or ability differences, and yet can lead to the social exclusion of girls and women from childhood through to adulthood. In early childhood, when participants did not provide an equitable response, they showed a greater tendency to say that members of their gender in-group were usually good at STEM, can be good at STEM and should be good at STEM. By comparison, in middle childhood and adolescence, equitable responses to stereotype measures become the most prominent response type. However, where in-group bias is apparent, it is seen amongst male participants in middle childhood when asked who is usually good at STEM. These participants were more likely to express male-bias than female-bias. This reflects the influence of entering the formal schooling context, where boys' ideas about their STEM ability are reinforced and girls may be dissuaded from their belief that they can and should be good at STEM. In adolescence, female participants are just as likely as male participants to say that both boys and girls are usually, can, and should be good at STEM. In spite of their self-reported equitable STEM ability stereotypes, adolescent girls lose interest in STEM and are less well represented by the time they reach college. This suggests that less equitable explicit stereotypes held by adolescent girls themselves are not necessarily the root cause of this loss of interest. Instead, research should look to more implicit stereotypes, or the influence of stereotypes held by STEM gatekeepers that may invoke stereotype threat and in turn reduce interest, as causes of this drop in interest. Participant gender also played a role in stereotype responses independent of participant age. When asked who was usually good at STEM, male participants were more likely to show male bias than were female participants, and vice versa for female bias. Male participants demonstrated greater male bias than did female participants. Traditional stereotypes emphasize the success and ability of men in STEM. However, in the present work, children's and adolescents' stereotype responses did not always align with this idea of male superiority. Together these findings stress the importance of interventions throughout development. Developing methods to foster early beliefs about women's STEM ability during early childhood, while not perpetuating ideas of adult male dominance, is an essential step. A focus in early childhood on the many successful female scientists, mathematicians and innovators from the fields of engineering and technology could be a key strategy to strengthen the

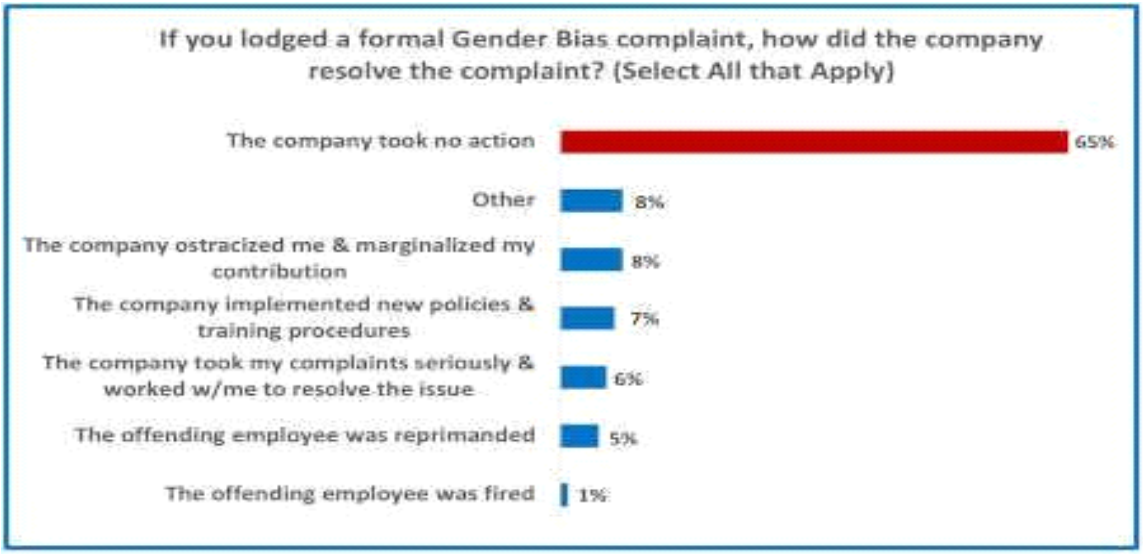
idea that women usually, can and should do well in these domains. At the same time, by middle childhood and adolescence it is important to target interventions towards boys, who (when not giving equitable responses) in this age range are more likely to show in-group bias than girls. By adolescence, where critical consciousness and an understanding of inequality emerges, education regarding systematic under-representation in STEM may be an effective tactic in challenging male-bias where it does exist. Gender stereotypes negatively influence perceived self-efficacy, course enrollment and career length for women in STEM. Understanding the role of stereotype-confirmatory behaviors and the presence of STEM materials that reinforce stereotypes associating science with men may help us to understand when and how interventions can serve to challenge gender stereotypes. Developing ways to challenge conceptions about who should be able to succeed in science is a key focus for educators and policy-makers, and informal science learning settings are likely to be an important context where strategies can be developed to promote more equitable beliefs around STEM and gender.



Stereotypes and bias continue to persist in many STEM fields, posing significant challenges for women. Discrimination against these groups is a persistent issue that can hinder their progress in STEM fields. These biases may manifest in subtle yet impactful ways, such as assumptions about their abilities or interests, which can limit their opportunities for growth and advancement. For example, women may face prejudiced assumptions that they are not as competent or interested in STEM fields compared to their peers, leading to biased treatment in academic and professional settings. Such stereotypes and biases can create a hostile environment that undermines the confidence and motivation of women, ultimately deterring them from pursuing STEM careers. Addressing and challenging these deeprooted stereotypes and biases is crucial to promoting diversity and inclusivity in STEM fields and providing equitable opportunities for women and minority students to succeed. Stereotypes and bias can influence the representation of women in STEM fields at various stages of their academic and professional journey. For instance, these biases may impact the recruitment and selection processes, leading to unequal representation of women in STEM programs or job opportunities. Additionally, stereotypes and bias can

affect mentoring, sponsorship, and networking opportunities, which are critical for career advancement. Women may face challenges in finding mentors or sponsors who can guide and support their career aspirations, further hindering their progress in STEM fields. The effects of stereotypes and bias can extend beyond overt discrimination and impact the daily experiences of women in STEM fields. Microaggressions, subtle forms of discrimination, can be pervasive in academic and workplace settings, resulting in a hostile environment where individuals feel invalidated, marginalized, and excluded. These

microaggressions may include demeaning comments, lack of recognition, or being overlooked for opportunities, which can have a cumulative effect on the motivation and engagement of women in STEM fields. Stereotypes and bias can also shape the self-perception and identity of women and minority
students in STEM fields. Internalizing negative stereotypes or facing imposter syndrome can create self-doubt and diminish the confidence of women and minority students in their abilities to succeed in STEM fields. This can contribute to a lack of representation, as these individuals may choose to leave STEM fields or not pursue them in the first place due to a perceived lack of belonging or confidence. According to ITIC's survey that was made in 2023, the survey found gender bias allegations among women STEM professionals continuing to trend upwards, with 78% (1,443) of survey respondents reporting they had been victims. Gender bias, like sexual harassment, takes many forms. This includes being asked inappropriate questions during job interviews, and positional bias (segmenting jobs and titles based on gender). Gender bias also encompasses the "Glass Ceiling," or the "Pink Ghetto," in which women get passed over for promotions or are assigned to train male coworkers/peers/subordinates who are promoted ahead of them and above them. Respondents to the ITIC survey also frequently referenced how the "Mommy Track," their decision to have children, derailed promotions and pay raises.



11.2. The Matilda Effect

Matilda effect is a theory that addresses sexist discrimination in the world of science.
It speaks out against the times when female scientists have received fewer prizes and less credit and recognition than men, even when their work was just as — if not more– important. It's also interesting to see that this term actually comes from its male counterparts. To understand the Matilda effect, first you have to know how the male version, the Matthew effect, came about. Robert K. Merton is the sociologist who coined the term. He used Saint Matthew's words to address a phenomenon that involved several aspects of life. In the Parable of the Talents, Matthew gives a lesson worth thinking about. "So take the talent from him, and give it to the one with the ten talents. For to all those who have, more will be given, and they will have an abundance; but from those who have nothing, even what they have will be taken away." -Mathew 25: 14-30, The Parable of the Talents-
This is about how work done by unknown people gets less attention, consideration, and recognition compared to work that's not more important, but done by people who are already renowned or famous. The theory tries to explain why less well-known people's work doesn't get mentioned as often as more famous people, even when the famous people's work is not better. That's why people without sponsors or who are still young and not famous end up in the background. They end up hidden under the

gigantic shadows of more famous authors.The Matilda effect is a theory that Margaret W. Rossiter published in 1993. This historian used the Matthew effect as the basis for speaking out against and putting a name to the way women's work was seen as less valuable than men's. She wanted to speak out against when female scientists' discoveries and research are pushed to side just because of their gender, not the quality of their work. The point is that they get less credit and recognition than they would if they were men. Little by little women have been breaking into the world of science. In some countries they still can't earn degrees or drive. In most others they can go to universities and get Ph.D's, but they still don't work in the same conditions as men. Men don't just have the advantage with awards. On top of prizes, there are the issues of pay, jobs, research funding, and publication. These are all areas where men have an advantage just because they're men. Because of that, brilliant female physicists, chemists, sociologists, and doctors end up by the wayside. The system files their work away or neglects it without any explanations. They end up without any of the recognition they deserve. Rossiter specifically called it the Matilda effect in honor of Matilda Joslyn Gage. She was an activist, freethinker, prolific author, and pioneer in American sociology. She was also one of the pioneers in the fight for equal rights for women. One major thing she did was support Victoria Woodhull, one of the first women to run for president. She was a mother to a large family, published much writing that spoke out against a lack of freedom, and called out for equal opportunities. Her work led her to become the president of the National Woman Suffrage Association for many years. Inspired by her legacy, the Matilda effect exists to speak out against women suffering from injustice in their professional lives. But the truth is that cases exemplifying the Matilda effect aren't just from centuries ago. It is still around today in the unjust situations women go through. The working world is just one of many examples of where women still face discrimination. Let's see an example. Going back to the Nobel Prize, it's a fact that the biggest awards are for scientists. Lise Meitner and Rosalind Franklin are two women who made big contributions in the scientific realm. Meitner played a part in discovering nuclear fission. Franklin's work had to do with discovering DNA's double helix structure. But neither of them received any recognition from the Nobel committee. Yet their male colleagues did get recognition — thanks to the work of those two women. In fact, Meitner's case is one of the best examples of how scientific discoveries made by women end up completely neglected by the Nobel Prize Committee. The world needs to agree that the value of a person's work should have more to do with what it says than who does it.

Previous Matilda Effect Cases

Lise Meitner :

Lise Meitner was an Austrian physicist who played a key role in the discovery of nuclear fission. Together with Otto Hahn, she studied the atomic nucleus for many years. In 1938, Meitner was dismissed from her position in Nazi Germany because of her Jewish background and forced to flee the country. However, despite his exile, he maintained scientific contact with Hahn and provided theoretical explanations for Hahn's experimental findings. This theoretical interpretation suggested that the uranium atom was split in two by neutron bombardment and that this produced a release of energy:

nuclear fission. But the 1944 Nobel Prize in Chemistry was awarded only to Otto Hahn. Meitner was neither co-recipient of the prize nor mentioned in the Nobel statement. The male-dominated scientific community ignored both her theoretical brilliance and her scientific leadership. This is a striking example of the systematic suppression of the achievements of not only a woman, but also an exiled Jewish scientist.

Rosalind Franklin :

Rosalind Franklin laid the foundations of modern biology with her work on unraveling the structure of DNA. Her work on X-ray crystallography at King's College London yielded the clearest image yet of the double helix structure of DNA - an image that would later become known as “Photo 51”. However, without Franklin's knowledge or permission, this photograph was shown to James Watson and Francis Crick by his colleague Maurice Wilkins. Watson and Crick used this data in their models and published their famous paper in Nature. Although Franklin's paper was published in the same issue, it was presented as if it was merely a supporting detail of their model. In 1962, the Nobel Prize was awarded only to Watson, Crick and Wilkins; Franklin had succumbed to cancer in 1958 and was in no condition to receive the award. But the Nobel Committee chose not to recognize him, even though it was clearly aware of his contributions before he died. For years, Franklin's contribution remained in the shadows of the scientific archives; it is only in recent years that his name has been deservedly revived.

Hedy Lamarr :

Austrian-born actress Hedy Lamarr was a remarkable woman who made a name for herself in Hollywood with her beauty and intelligence, but her contribution to science was in the field of engineering. During World War II, she and George Antheil developed a frequency hopping communication system to prevent enemy navies from interfering with the control signals of torpedoes. They patented it in 1942, but the US Navy did not put it into practice, deeming the technology “too complex”. In reality, the idea that a woman, and especially a movie star, could have invented such technology was not taken seriously. The technology was developed after the patent expired and became the basis for many wireless communication technologies, from cell phones to Wi-Fi. Lamarr made no financial gain in the process. Known only as a “pretty face” during his lifetime, Lamarr was only posthumously honored for his scientific genius.

Katherine Johnson, Dorothy Vaughan and Mary Jackson:

These three black women mathematicians played critical roles in NASA's space program. Katherine Johnson was instrumental in John Glenn's ascent into space with her orbital calculations; Glenn said before the flight, “I trust Katherine's calculations, not computers.” Dorothy Vaughan was one of the first black female managers at NASA, specializing in early programming languages such as Fortran. Mary Jackson had to go to court to get an engineering degree and became one of NASA's first black female engineers. For many years, however, these women's names were left out of the history of science. They were either not mentioned in the documents at all, or only described as technical support staff. It was only with the 2016 film Hidden Figures that their stories became visible. This invisibility was the result of not only gender but also racial discrimination.

Jocelyn Bell Burnell :

British astrophysicist Jocelyn Bell Burnell was the first person to observe pulsars. In 1967, while a PhD student at Cambridge University, she noticed regular radio signals in the sky. This signaled a previously unknown type of celestial body. But the 1974 Nobel Prize in Physics was awarded to his mentors Antony Hewish and Martin Ryle; Bell Burnell's name was not mentioned. Although Bell Burnell took this with maturity, the scientific community had downplayed his contribution. The discovery of pulsars was due to her patience, vigilance and determination - but the prizes went to men in positions of authority.

Esther Lederberg :

Esther Lederberg was a pioneer in molecular biology and genetics. She discovered the Lambda bacteriophage - a virus that is one of the cornerstones of genetic engineering. She also developed the method of replica plating, which made it possible to study concepts such as antibiotic resistance. But her husband, Joshua Lederberg, was recognized as the principal author of many of these discoveries and won the 1958 Nobel Prize in Medicine. Esther's name did not appear in the prize description, nor was her work independently highlighted. It was a classic scenario for women in academia: the male collaborating partner was rewarded, while the woman was ignored.

Chien-Shiung Wu :

Chien-Shiung Wu, a Chinese-American nuclear physicist, was one of the most influential experimental physicists of the 20th century. His most famous contribution was the Wu Experiment, which proved that the principle of "parity conservation" does not hold in weak nuclear forces. This work confirmed the prediction of the theoretical physicists Tsung-Dao Lee and Chen-Ning Yang and was awarded the 1957 Nobel Prize in Physics. But without Wu's experimental work, this theory would have been impossible to verify. Wu's name was completely ignored by the Nobel committee. Moreover, throughout her career, many of her scientific contributions were overshadowed by her male colleagues, even though her students and contemporaries nicknamed her the "Queen of the Nucleus". Despite being one of the women who etched her name in the history of science, it was only posthumously that she began to receive the international honors she deserved.

Nettie Stevens :

American geneticist Nettie Stevens was one of the first scientists to discover the role of the X and Y chromosomes in the genetic determination of sex. Her work in 1905 showed that male sperm cells carry either X or Y chromosomes, so sex is determined by the sperm. However, Thomas Hunt Morgan, a more famous scientist at the time, downplayed Stevens' work and much of the scientific credit for this went to him. Stevens was beginning to gain academic respect in his lifetime, but he died of cancer at a young age. After her death, her name faded into oblivion; instead, her male colleagues were placed at the forefront of scientific history. Although Stevens' work is one of the cornerstones of modern understanding of genetics, it is only recently that her name has been mentioned in textbooks again.

Cecilia Payne-Gaposchki

In her doctoral thesis at Harvard in 1925, British astrophysicist Cecilia Payne proposed that stars are composed mainly of hydrogen and helium. This was completely contrary to the prevailing views at the time. Her thesis advisor, Henry Norris Russell, advised her to avoid this conclusion because the idea was considered "absurd" by the scientific community. A few years later, however, Russell published the same result under his own name - this time without mentioning Payne's name. Nevertheless, Payne's work revolutionized astrophysics. For years, however, Harvard University was reluctant to give her a professorship. She had to wait until the 1950s to become the first woman professor and the first woman department head. Her story is a striking example of a world of science where women's ideas are both stolen and systematically suppressed.

Lillian Gilbreth :

Lillian Moller Gilbreth was an American psychologist and industrial engineer at the turn of the 20th century. She was an expert in efficiency and organizational psychology, the principles of which she applied not only as a management consultant for major corporations, but also to her household of twelve children, as chronicled in the book Cheaper by the Dozen. Her long list of firsts includes first female commencement speaker at the University of California, first female engineering professor at Purdue, and first woman elected to the National Academy of Engineering. Together with her husband Frank Gilbreth, she studied "time and motion" and developed analyses to improve productivity. After Frank's death, however, the scientific community did not take Lillian's individual contributions seriously. Many of her male colleagues downplayed the ergonomics-based solutions she developed as both an engineer and a psychologist. Lillian also developed innovative ideas on kitchen design and

domestic technologies to make life easier for working women. Yet these contributions were often seen as “feminine work” and treated as having no scientific merit. Even today, her name is rarely mentioned in comparison to the recognition it deserves.

11.3. Underrepresentation and Absence of Role Models

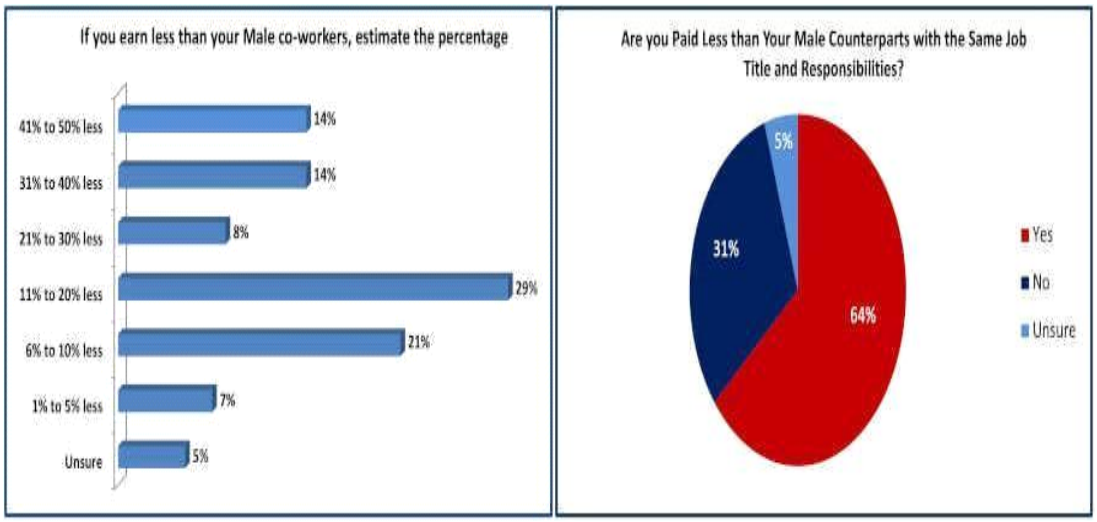
The fields of Science, Technology, Engineering, and Mathematics (STEM) are crucial drivers of innovation, economic growth, and societal progress. However, despite the growing recognition of the importance of diversity in these fields, women continue to be underrepresented in STEM disciplines. This underrepresentation has significant implications, not only for the affected individuals but also for the fields of STEM as a whole, as it limits the diversity of perspectives, ideas, and solutions that can be brought to the table. The underrepresentation of women in STEM fields is the existence of stereotypes and bias. Despite progress in recent years, stereotypes about the abilities, interests, and roles of women in STEM persist. These biases can be subtle, often operating at an unconscious level, and can influence the expectations and treatment of individuals from these groups. For example, women may be assumed to be less capable or less interested in STEM subjects, which can lead to lower expectations and fewer opportunities for them to excel in these fields. Moreover, stereotypes can also influence the self-perception and self-efficacy of women, leading them to internalize and conform to these biased expectations, which can further limit their interest and participation in STEM fields. Contributes to the underrepresentation of women in STEM fields is the lack of visible role models. Role models play a crucial role in shaping individuals' aspirations and career choices, as they provide inspiration and guidance on what is possible. However, women often face a scarcity of role models in STEM fields, which can make it difficult for them to envision themselves succeeding in these fields. This lack of representation can lead to a sense of isolation and can further perpetuate the belief that STEM fields are not for individuals from these groups. Furthermore, the lack of role models can also impact the perceptions of others about the capabilities and suitability of women for STEM fields, reinforcing stereotypes and bias. Educational inequities also play a significant role in the underrepresentation of women in STEM fields. Access to quality education and resources is not uniform across different communities and socioeconomic backgrounds, which can create disparities in opportunities for learning and development. For example, students from lower-income backgrounds may face challenges such as underfunded schools, lack of access to advanced coursework or extracurricular activities, and limited exposure to STEM careers and professionals. These barriers can limit the ability of women to acquire the skills and knowledge needed to excel in STEM fields, putting them at a disadvantage compared to their peers from more privileged backgrounds. Moreover, the lack of representation and diversity in educational settings can also impact the sense of belonging and inclusion of women in STEM fields, further perpetuating the underrepresentation. Cultural factors also contribute to the underrepresentation of women in STEM fields. Cultural norms, values, and expectations can shape individuals' perceptions of what is considered acceptable or desirable in terms of career choices. In some cultures, there may be gendered expectations or biases that discourage women from pursuing careers in STEM fields, or that limit the opportunities available to them. For example, there may be societal expectations for women to prioritize family or caregiving roles over careers in STEM, or there may be cultural stereotypes about the abilities or interests of women in these fields. These cultural factors can influence the aspirations, motivations, and choices of women, shaping their interest and participation in STEM fields. STEM fields have traditionally been male-dominated, with limited diversity in terms of gender, race, and ethnicity among colleagues and leadership. This lack of diversity can create a culture that is unwelcoming or exclusionary to women, leading to feelings of isolation and a lack of belonging. Research has shown that workplace cultures that do not value diversity, equity, and inclusion can lead to lower job satisfaction, higher turnover rates, and reduced productivity among employees from underrepresented groups. Workplace cultures that do not support work-life balance can disproportionately impact women, who may face additional

responsibilities or barriers due to societal expectations or caregiving roles. The absence of prominent role models can create significant hurdles for women pursuing careers in STEM fields. Without visible examples of successful individuals who share similar backgrounds and experiences, these students may feel isolated and unsupported in their academic and professional endeavors. The absence of role models can exacerbate imposter syndrome, leading students to question their own abilities and worth in these fields. This can have a profound impact on their interest and participation in STEM, potentially deterring them from pursuing careers in these fields altogether. When young people lack tangible examples of individuals who have achieved success in a given area, it can be challenging for them to envision themselves following a similar path. This is particularly true for women, who may already face additional barriers and obstacles in STEM fields. The lack of role models is therefore a critical issue that must be addressed in order to encourage greater diversity and inclusivity in STEM fields. By increasing the visibility of successful individuals from a range of backgrounds, we can inspire and motivate the next generation of students to pursue careers in STEM and unlock their full potential. Exposure to role models is an essential factor in promoting interest and participation in STEM fields. Role models serve as tangible examples of what is possible and provide inspiration, guidance, and mentorship to young people seeking to pursue similar paths. However, for women, the absence of role models can be particularly detrimental to their success in STEM. The lack of diversity in STEM fields, combined with a historical underrepresentation of women in these fields, can make it challenging for these students to find individuals who share similar backgrounds and experiences. This can lead to feelings of isolation and disconnection, which can significantly impact their interest and motivation to pursue STEM careers. That role models can have a positive impact on the retention and success of women in STEM. When women have access to visible and relatable role models, they are more likely to persist in their studies and careers. Role models can provide valuable mentorship, advice, and support, helping students navigate the challenges and obstacles they may face along the way. They can also offer insights into how to overcome biases and stereotypes that may exist in the field and help students build the skills and networks necessary for success. The lack of visible role models is a significant challenge facing women in STEM fields. Without relatable examples of successful individuals who share similar backgrounds and experiences, it can be challenging for these women to envision themselves succeeding in these fields. The absence of role models can also exacerbate imposter syndrome and lead to lower interest and participation in STEM fields. To address this issue, it is crucial to increase the visibility of successful individuals from diverse backgrounds and provide mentorship and support to women pursuing STEM careers. By promoting greater diversity and inclusivity in STEM, we can unlock the full potential of the next generation of women students and pave the way for a more equitable and innovative future.

11.4. Gender Pay Gap

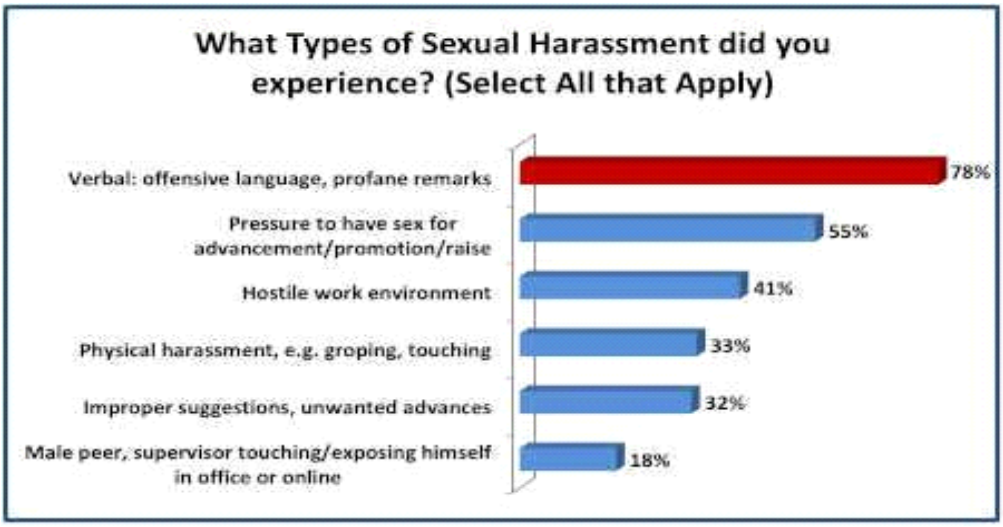
The percentage of women professionals in Science, Technology, Engineering and Math (STEM) who said in a survey that they are paid less than their male coworkers for performing similar work jumped to 64%, up from 39% just two years ago.That was one finding of an independent Web survey conducted by Information Technology Intelligence Consulting Corp. (ITIC), a research and consulting firm in suburban Boston. ITIC polled 1,850 women STEM professionals worldwide from March through September 2023. The independent Web survey included multiple-choice and essay questions. ITIC also conducted first-person interviews with 30 women STEM professionals who had responded to the survey, to gain deeper context about their experiences. ITIC accepted no vendor sponsorship money, and none of the participants received remuneration. While the gender pay gap is narrowing, women have yet to achieve parity with men in the overarching U.S. workplace, or in the STEM workforce. In 1963, women earned $0.60 for every $1 men were paid, according to President John F. Kennedy when he signed the Equal Pay Act into law. The 2023's U.S. Bureau of Labor Statistics released in July 2023 found that women are paid $0.84 for every

$1 earned by their male counterparts. By a 2-to-1 margin, the ITIC women STEM survey respondents reported earning less than their male co-workers for comparable jobs. To reiterate, 64% (1,184) of the 1,850 total respondents to the 2023 survey said they earn less than men in STEM, versus 31% (574) of women STEM survey participants who said they were paid on a par with their male colleagues. The remaining 5% (93) were "Unsure."As the survey depicts, 29% (343) of the women STEM professionals responding to the survey estimated they made 11% to 20% less than their male co-workers, while 28% (332) said their STEM salaries were from 31% to 50% less than their male peers.



11.5. Workplace Harassment and Discrimination

Harassment and discrimination in the workplace are two of the most chilling and deeply entrenched obstacles women in STEM still face. These challenges permeate far more than the occasional incident and instead are an integral part of a larger culture of exclusion, intimidation, and institutional bias. Women in institutions are regularly bombarded with unwelcome comments, inappropriate advances, sexist jokes, or condescending assumptions about their competence. Underlying these obvious actions is a more subtle but insidious form of discrimination: women constantly being passed over for leadership positions, having fewer opportunities to spearhead high-profile projects, and formally paid less than their male colleagues for equivalent work. This creates an unwritten but acutely perceived glass ceiling that becomes harder to shatter as women move higher within their careers. Moreover, women most often report experiencing the phenomenon of "prove-it-again" bias — repeatedly having to demonstrate their competence in ways that men do not have to, such as a woman's mistake being taken as evidence of unfitness for the profession, whereas the same mistake by a man would be attributed to an aberration. In workplaces, the work done by women gets marginalized or gets placed elsewhere, generating the view that women are not as skilled or innovative. Many women also receive "maternal wall" prejudice, by which they are critiqued as being less committed or productive according to familial needs, regardless of their actual performance.



According to the ITIC 2023 survey, it is shown among the women STEM professionals who responded to the survey that they had been sexually harassed, 78% (881 women) claimed they were subjected to verbal harassment in the workplace that included offensive language as well as crude or lewd remarks about their bodies/anatomy, and profanity. More than half 55% (666) of the ITIC survey respondents reporting having experienced sexual harassment in the workplace said they had been pressured to have sex in exchange for promises of advancement, promotion, an increase in salary, or even good grades. A third (33%, or 373) of survey participants reporting having experience such harassment said it rose to the level of an actual physical assault, such as touching, groping, or forcible kissing. Of the 61% (1,129) of women STEM survey respondents who alleged sexual harassment, 29% (327) reported filing formal complaints with their company's Human Resources (HR) departments. Of that number, 61% (689) of the respondents said their employers took no action on those complaints compared with 5% (56) of respondents who said their firms fired the sexual harasser. Nearly one-third (32%, or 361) of women STEM professionals who reported they were sexually harassed opted to leave their firms. This is up 4 percentage points compared to the 28% (231) of harassment victims who quit their companies in the 2021 ITIC survey, and a jump of nine percentage points from the 23% (124) women who left their firms in ITIC's 2019 poll. Of the 61% or 1,129 women STEM professionals who said they've experienced workplace sexual harassment, 87% (982) women respondents said the harassers were men. This statistic has remained unchanged since the 2019 poll. Another 6% (68) said they were sexually harassed by female colleagues or superiors, and 7% (79) said both men and women had harassed them.

11.6. Absence of Support and Mentorship

In the high-pressure, highly competitive worlds of science, technology, engineering, and mathematics, support and mentorship are not luxuries — they are necessities. For most women, however, especially for women from underrepresented groups, such mentorship is glaringly absent. Mentorship is not simply expert guidance; it provides a critical framework for building confidence, mediating complex institutional hierarchies, and accessing opportunities that are often hidden by informal networks. However, since women are not well-represented among senior academic or executive roles, many junior women in STEM do not have visible role models who have successfully overcome similar challenges. The lack of mentorship has far-reaching implications. Without champions in the guise of mentors, women miss out on opportunities to speak, receive research grants, and be part of collaborative projects — all of which are essential for academic and career advancement. Male networks operating outside of formal structures, such as conference cliques or lab pecking orders, typically exclude women from these routes of power, leaving them professionally isolated. This segregation is especially pronounced in fields like physics, computer science, and engineering, where

the gap is widest. Moreover, the underrepresentation of women in leadership positions often means that structural problems — e.g., gender bias in evaluation criteria or hiring processes — go unremedied, as decision-makers may lack awareness or inclination to do so. Women also carry the special emotional burden: the need to be a great scientist and an informal ambassador for their gender. The absence of mentorship adds to this even more, as so many women struggle alone with imposter syndrome, workplace politics, and institutional pushback. This occurs over time to build stagnation, frustration, and in a majority of cases, the decision to leave STEM altogether — a talent drain that is entirely preventable but habitually repeated.

11.7. Work-Life Balance Pressures

Work-life balance pressures remain one of the most significant — yet most overlooked — challenges for women in STEM. Careers of most scientists and technologists are based on outdated assumptions that ignore caregiving realities, particularly for women. Late work hours, the stress of constantly being on call for grant writing or research partnership, and the compression of boundaries between work life and family life make it nearly impossible for most women to fulfill both career and family obligations without significant sacrifice. Even though these pressures impact all professionals, women are unfairly burdened because they still shoulder the social expectation that caregiving and household work are primarily their responsibility. This imbalance is most severe at critical junctures in a woman's career — graduate school, post-doc, or early-career faculty rank — when professional balance is tenuous. Having children, caring for a sick relative, or even attending to one's own personal health and well-being all too frequently carries penalties that disfigure long-term career trajectories. Women returning from maternity leave, for instance, typically find that they have been excluded from important projects or assumed to be less ambitious. Additionally, in the competitive world of academia and research, career gaps are seen as lack of commitment regardless of the reason. In addition to institutional structures, cultural stigma plays a large role. Women who ask for flexible working conditions are termed "less serious," while men asking for the same are praised as being family-oriented. This double standard reinforces the notion that STEM careers are incompatible with a balanced life for women. As a result, many exceptionally talented women are forced to rein in their ambition or leave the field entirely — not because they are not competent, but because of the prevalent structural and cultural barriers that sanction them for wanting balance.

11.8. Cultural and Societal Expectations

Societal and cultural expectations make up the behind-the-scenes backbone of inequality within STEM, beginning long before women enter the workplace. From early childhood, girls are discouraged — explicitly or implicitly — from exploring math, science, and technology interests. They are told, verbally and nonverbally, that these fields are not "for them," too difficult, too masculine, or incompatible with femininity. These messages are delivered in the form of gendered toys, biased educational materials, and underrepresentation in science-related media. By adolescence, most girls have internalized the idea that they are inherently less competent in technical fields, and so have lower rates of participation in advanced math and science courses. Even when girls challenge these norms and pursue STEM degrees, the cultural pressure never fully abates. In most societies, a woman's worth remains intricately tied up with being a wife, mother, or carer, and so professional ambition seems to be a deviation from the norm. Women in science, technology, engineering, and mathematics are normally portrayed as outliers — exceptional but alone, prodigy but unpopular — reinforcing the idea that success in these subjects is at someone's personal cost. This cultural messaging discourages many young women from picturing a career in science or innovation, and produces a culture in which those who do survive must defend their choices constantly. Finally, social norms come to associate authority, objectivity, and rationality — all very prized aspects of science — with masculinity. This identification de-legitimates women's work and creates a credibility gap, where women must work twice as hard to be heard. These dynamics transcend any country or region; they

are a global phenomenon that cuts across borders and economic status. Ultimately, these cultural norms affect every stage of a woman's STEM career, from interest to long-term career satisfaction, creating an uneven playing field that few can surmount except at great personal and psychological cost.

- **Present Situation of World and Countries**

Investing in the development and promotion of female role models in STEM is not only about individual success—it is about transforming the landscape of the entire field. As more women step into leadership roles and share their expertise, they pave the way for a more diverse, dynamic, and innovative community. This ripple effect has the potential to drive significant advancements in research, technology, and industry. By ensuring that young women have access to the support, resources, and role models they need, we contribute to a future where talent and creativity are the cornerstones of progress. Every time a young woman sees a successful role model in STEM, she is more likely to believe that she too can overcome challenges and contribute to transformative solutions. The impact of female role models in STEM goes beyond inspiring individual careers—it contributes to the creation of a more inclusive and dynamic professional community. So here are some examples of these successful women role models in STEM:

Science, technology, engineering and mathematics (STEM) are seen as the fields of the future, with expanding job opportunities creating the goods, services and innovations that shape our daily lives.Yet women and girls form a third or less of the students, employees and innovators in these fields. When they do work in STEM, women earn 85% or less of what men are paid, and they are more likely to be the target of gender-based violence and sexism than women in other fields. Virtually no progress has been made in the past two decades. Women and girls remain less likely than men and boys to advance to the next stage of their education or career in STEM, despite equal capacity. To close the gender gap, STEM studies and careers must be made possible and worthwhile, as a competitive choice for girls and women. This policy brief identifies mechanisms to improve women's and girls' aspiration, participation and retention in STEM fields, from early education through to careers, illustrated by actions within G20 countries. India has made significant strides in promoting gender equality in STEM education through targeted scholarship programmes aimed at supporting women pursuing engineering and technology studies. One notable programme is the Pragati Scholarship Scheme launched in 2014 by the All India Council for Technical Education (AICTE). This initiative specifically targets women pursuing technical education, providing financial assistance to cover tuition fees and other educational expenses. The scheme is designed to support the education of up to two girls per family and is open to students enrolled in diploma and degree programmes in AICTE-approved institutions. In 2020, the number of scholarships granted annually was more than doubled from 4,000 to 10,000. This programme not only alleviates the financial burden on families but also encourages more women to enter and complete STEM education. The Athena Scientific Women's Academic Network (SWAN) Charter, initially established in the United Kingdom of Great Britain and Northern Ireland in 2005 and later adopted in Ireland and Australia in 2015, provides a framework for supporting and transforming gender equality across higher education and research. Institutions that sign up to the charter are required to develop action plans to promote gender equality and foster an inclusive environment for women in STEM, including staff and students. Positive impacts perceived by both women and men included structural and cultural changes, including enhanced support for women's careers, increased appreciation of caring responsibilities, and efforts to combating discrimination and bias. In addition, implementation of new mentoring schemes, career development seminars and annual personal development reviews were also cited, on top of policies such as core hours for meetings and improved maternity leave arrangements. The University of Guadalajara has established a Promotion Committee for Gender Equality and Office for Gender Equality, created a

Unit for Equality in 2021 to coordinate related policies and programmes, built the Centre for Gender Studies to focus on research and teaching on gender issues and implemented the UNESCO Chairs in Gender, Leadership and Equity and in Equality and NonDiscrimination. These structures introduced policies and frameworks, such as an ethics code emphasizing equality and non-discrimination, a strategy against gender-based violence with protocols for reporting and support as well as disaggregated data to address gender gaps, and incorporated gender equality into the university's development plan, including curriculum content and governance representation. Related programmes and activities have been promoted, including gender sensitization conferences and workshops reaching thousands of participants, and a compulsory gender equality course for new staff and students was launched in 2021. A particularly innovative activity is the Men's Circle. Promoted by UN Women, it offers training and spaces for male students to discuss masculinity and the roles men can play in the promotion of gender equity. An important success factor was initial support from a federal government programme, which helped prioritize gender equality at the strategic level and kickstart activities later consolidated and sustained by the university's own resources. Germany's dual vocational training system integrates classroom instruction with on-the-job training, providing students with practical experience in their chosen fields. This system has been particularly effective in promoting women's participation in technical fields by offering structured mentorship and clear career pathways, particularly useful given that women in STEM possessed less labour market experience compared to men STEM students and their women counterparts in non-STEM. Genderspecific scholarships and initiatives aimed at encouraging girls to enter non-traditional trades have also contributed to higher enrolment rates in STEM related TVET programmes. Through a blend of framework documents and practical steps, support is growing for women in scientific fields in China. In 2021, the Ministry of Science and Technology (MOST), the China Association for Science and Technology (CAST) and eleven other departments jointly issued the "Notice on Several Measures to Support Women in Science and Technology Talent to Play a Greater Role in Scientific and Technological Innovation." In the same year, the All-China Women's Federation, the MOST, the CAST and four other departments released "Opinions on Implementing the Women's Action Plan for Scientific and Technological Innovation." Multiple measures have been taken since, focusing in particular in improving access to funding for initiatives supporting women's STEM professionals. For instance, in 2023, the CAST launched a call for applications with a total funding of 2.6 million RMB for projects aimed at supporting STEM women professionals, including S&T innovation workshops, communication campaigns and mapping surveys of women scientist organizations .Awards of a higher monetary value were more likely to be awarded to men by science granting councils (SGCs) in Sub-Saharan Africa, according to a 2022 study of 15 such SGCs. Although the SGCs have achieved near parity in the number of grants given to men and women, practical and policy-supported change are needed to address imbalances in value and in SGC staffing (36% women). In 2017, none of the SGCs had policies or frameworks to mainstream gender into their science, technology and innovation (STI) initiatives. Several councils have since developed gender policies. Councils in Côte d'Ivoire, Kenya, Mozambique, Malawi and Senegal have implemented activities to support women in the steps preceding grant funding, such as gender specific funding instruments supporting women training at master's and doctoral levels. Malawi's SGC supported an association of women scientists, while Ethiopia's SGC focuses on capacity building and financial support for women scientists in universities. Some SGCs also recognize women's research excellence through prestigious awards and offer workshops in grant proposal writing. These efforts are complemented by initiatives like mentoring early career scientists and identifying senior women scientists as role models.

- **Possible Solutions Upon This Agenda**

Providing equitable access to STEM resources, equipment and activities is crucial for boosting engagement among girls in STEM subjects, with such access among the top three drivers of girls'

choice to study STEM based on the Gender Scan Survey 2021. Schools with well-equipped science laboratories, technology kits and access to extracurricular STEM activities see higher participation rates from girls. Hands-on learning experiences, such as coding clubs, science fairs and STEM-based competitions, enable girls to develop practical skills and foster a passion for STEM fields. These activities also offer a platform for girls to showcase their talents and build confidence in their abilities. Whether online or in-person, such activities can create meaningful encounters for girls to see what STEM careers may be like for someone with whom they identify. A growing variety of such options are available in many G20 countries and with regional or even global online options, which may or may not be segregated by gender or target vulnerable groups of girls. To create these experiences, countries are partnering with a growing number of non-profit and civil society initiatives targeting girls and STEM. For example, Canada has invested some USD 11 million since 2019 to promote STEM educational and occupational opportunities to teachers and students up to grade 12 through STEM career profiles and models. The gender gap can be narrowed by supporting equal participation and leadership in STEM through targeted policies, measures and initiatives addressing each stage of STEM. This includes dismantling gender stereotypes, creating open educational pathways for girls in STEM and removing obstacles and building supportive environments that attract, retain and advance women to thrive in STEM studies and careers. These efforts must be backed up with the collection of gender-disaggregated data on a regular basis at country level to devise evidencebased policies and monitor progress.

Gender-responsive and gender-transformative policies and support systems targeting or developed within academic, research and training institutions can boost women's access into STEM programmes, leading to flow-on positive effects from greater diversity. Creating gender quotas or providing gender-responsive training to address the biases of selection processes and committees can shift patterns in initial acceptance or placement, although still dependent on women wishing to apply. Scholarships and funded learning exchanges can also provide financial incentives for women in STEM fields. In addition, support systems for balancing education and family responsibilities are particularly important for women students at an age when many are expected to hold caring responsibilities and start families of their own. For instance, in Japan, as of early 2024, at least 40 universities have implemented a quota system for women applicants in fields related to STEM – fields where women represent less than a third of all students, dropping to 15% for engineering at the undergraduate level. Some 700 places across these universities have been set aside for women applicants in the 2024 entrance examinations.The introduction of these quotas is a response to the Ministry of Education, Culture, Sports, Science and Technology (MEXT) enrolment selection implementation guidelines for 2023, in which a section on "the inclusion of those with a diverse background" put special emphasis on women in STEM fields. To bolster women's participation and retention in STEM fields, ensuring they have fair and equal pay as well as equal access and equitable assessment for funding opportunities such as grants and fellowships is crucial. Financial incentives specifically designed for women can significantly enhance their access to career advancement in these fields and counter existing biases. For instance, the L'Oréal-UNESCO For Women in Science programme has rewarded outstanding women researchers for 25 years, in recognition of the contributions of their research, the strength of their commitments and their impact on society. The programme has benefited 127 International Laureates, 330 International Rising Talents and more than 4,000 young women researchers, half of them in developing countries. It provides not only financial support but also recognition, which can be pivotal in advancing their careers and extending their reach as role models, as well as awareness of their fields of study. It also raises awareness of the challenges faced by women in science and promotes policies and initiatives to address these challenges. In addition, UNWOMEN believes that with quality educational and legal frameworks, raising awareness systems via social and face to face

platforms, supportance of young girls and middle-aged women who wants to participate in STEM, making founding opportunities and many more possible solutions can be tabled upon this agenda by detecting the problems. For an instinct,

- **Dismantling gender stereotypes and biases** in STEM to counter harmful gendered practices in and expectations about STEM fields, and raising awareness of the importance of the equal participation of women and girls in STEM education and workforces.
- **Enhancing visibility and recognition for** women and girls in STEM and for the contributions of women to STEM to raise public interest, to change mentalities and to showcase role models for future generations.
- **Strengthening gender-transformative** STEM education at all levels with attention to curriculum design, representation of women in teaching roles and in educational materials, inclusive equipment
and the quality of teacher training and support and counselling systems, along with community/parental engagement.
- **Creating mentorship and industry-partnered programmes and opportunities** for girls and women to connect with women as role models and mentors in STEM and to access industry and professional networks.
- **Ensuring fair and equal pay** as well as developing financing and investments for girls and women in STEM.
- **Fostering inclusivity within STEM funding mechanisms**, including by promoting women's access to key decision-making and management positions, including on relevant boards and panels.
- **Enacting gender-transformative policies and measures** to promote equality and diversity in the STEM community, including targeted measures such as mandated gender equality training, quotas and numerical targets to help address systemic barriers to girls and women.
- **Building transparency and accountability** within STEM workplaces and educational institutions regarding staff and student diversity, support systems and family planning, salary structures, contracts and financial allocations, among others.
- **Implementing zero tolerance policies and measures** to gender-based violence, including sexism and sexual harassment, as well as corporate social responsibility initiatives supporting women and girls in STEM workplaces.
- **Monitoring the participation, performance and perspectives** of girls and women in STEM education and careers, to build an evidence base for decisionmaking by collecting sex- and gender-disaggregated data on a regular basis at national level.

can be crucial.

- **Glossary**

STEM: An acronym for Science, Technology, Engineering, and Mathematics—fields essential to innovation and progress.
Gender Gap: The disparity between men and women in social, economic, educational, and political areas.
UNWOMEN: The United Nations entity working to empower women and promote gender equality globally.
Matilda Effect: The historical and ongoing undervaluation or misattribution of women's scientific contributions.
Glass Ceiling: An invisible barrier that limits women's advancement in professional hierarchies.
Role Model: A person who serves as an example to inspire others, especially younger generations.
Gender Stereotypes: Culturally reinforced beliefs about what men and women can or should do.

Gender Pay Gap: The average difference in income between men and women for similar roles.
Imposter Syndrome: Self-doubt and a sense of being undeserving of success, often experienced despite high achievement.
Witch Hunts: Historical persecution of women—especially those in science or medicine—under the guise of "witchcraft."

- **Questions to Ponder**
- Which challenges women face today in STEM?
- Why are women still underrepresented in STEM and how can education change this?
- How do stereotypes affect girls' interest in STEM and how can they be broken?
- What can workplaces do to reduce gender bias in STEM fields?
- How does the Matilda Effect impact recognition of women in science?
- What are possible ways to close the gender pay gap in STEM careers?
- Why are female role models important in STEM and how can we increase their visibility?
- How can media help change perceptions of women in STEM?
- What measures can stop harassment and discrimination in STEM environments?
- How can UN and governments support women's access to STEM globally?
- How does gender diversity improve innovation in science and technology?
- What can UNWOMEN do to solve gender gap in STEM?
- How can UNWOMEN support young girls and middle-aged women who want to participate in STEM?
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