# Bridging the Gender Gap in STEM Fields: Empowering Women for Economic and Social Development in Malaysia

RASHIDIN IDRIS[1], MD. FAISAL-E-ALAM[2], RUI ALEXANDRE CASTANHO[3,4,5,*], LUÍS LOURES[5]
[1]Faculty of Human Development,
Sultan Idris Education University, 35900 Tanjong Malim, Perak,
MALAYSIA

[2]Department of Management Studies,
Begum Rokeya University, Rangpur-5404,
BANGLADESH

[3]Faculty of Applied Sciences,
WSB University, 41-300 Dabrowa Górnicza,
POLAND

[4]College of Business and Economics,
University of Johannesburg PO Box 524, Auckland Park,
SOUTH AFRICA

[5]VALORIZA, Reaserch Center for Endogenous Resource Valorization,
7300-110 Instituto Politecnico de Portalegre (IPP),
PORTUGAL

*Abstract:* - The study's primary goal is to understand and address gender disparities in STEM education and careers in Malaysia. The methodology entails an in-depth review and analysis of existing policies, academic literature, and statistical data from previous reports. The study reveals that the gender discrepancy in STEM education and careers has significant ramifications, not just for women's economic empowerment, but also for the overall economic growth and development of the country. Also, research has demonstrated that the involvement of women in STEM education and professions is essential for promoting innovation, stimulating economic development, and propelling social advancement. However, despite efforts to advance gender equality in education and the job market, Malaysian women still face numerous obstacles when it comes to pursuing STEM education and employment. These obstacles include the underrepresentation of women in the workplace, the absence of female role models, a family-friendly environment, and societal norms and gender stereotypes that discourage women from entering traditionally male-dominated professions. This study emphasizes the importance of improving these issues to encourage female participation in STEM fields by empowering them for economic and social development.

*Key-Words:* - Women, STEM education, STEM career, Challenges, Economic growth, Social development.

Received: March 12, 2023. Revised: December 15, 2023. Accepted: January 11, 2024. Published: January 26, 2024.

## 1 Introduction

The engagement of persons in STEM-related education and employment is significantly influenced by gender, and the consequences for a country's economic development and innovation are of utmost importance. The female group's awareness and promotion of STEM topics is noteworthy, [1]. The global proportion of female scientific researchers is only 29.3%, in the Asia-Pacific region, women occupied 18.5% of research jobs in South and West Asia, 23.9% in East Asia and the Pacific, and 48.2% in Central Asia, [2].

Although there have been more endeavors to narrow the gender disparity in STEM fields, significant challenges still need to be confronted to ensure equal opportunities for both genders. Implementing evidence-based policies and programs has the capacity to improve female participation and engagement in STEM fields, as supported by research, [3]. Furthermore, the growing focus on promoting diversity in science, technology, engineering, and mathematics (STEM) education has led to an increase in studies that sheds light on the experiences of women in STEM programmes in the field of education, [4].

The presence of gender disparities in STEM fields has significant implications for practices, policies, and future outlooks. The disparity in the enrolment and academic achievement of students in math courses based on gender has decreased in recent decades, [5]. The importance of STEM education lies in its ability to empower female students to achieve their maximum capabilities and pursue professions in traditionally male-dominated sectors, thus fostering a workforce that is more varied, innovative, and inclusive. The school sector can foster girls' and women's engagement in STEM education and careers, [6]. Furthermore, it is widely acknowledged that the major mechanism of gender disparity in academia is the slower pace at which women advance in the academic hierarchy compared to men, [7].

Families play a crucial role in promoting STEM education and employment among female students by offering the essential support, encouragement, and resources needed to overcome societal obstacles and gender biases. This helps instill confidence and determination in their daughters, enabling them to thrive in these domains. The importance of family and achieving a balance between work and personal life in influencing career decisions has been explored, [8]. According to, [9], when parents have employment that does not include manual labor, female adolescents tend to achieve better academic success in STEM subjects compared to their male peers. The family's provision of essential support, motivation, and resources plays a crucial role in encouraging female students to seek and excel in STEM professions.

Female maths and science teachers are especially significant because they might act as role models for young girls by offering the necessary support and encouragement to foster a love of STEM education and inspire future female leaders in these fields. The percentage of female maths and science educators in an institution has a strong influence on the possibility of female pupils choosing and completing with a degree in the STEM fields, [10]. According to, [11], women outnumber men in the engineering industry. Representation is critical if those figures are to rise. Young girls will grow up believing that they have no place in STEM courses if there is no female representation.

Furthermore, because STEM discoveries have enormous potential to promote long-term development, low rates of participation and accomplishment among girls and women may have a negative impact on broader social growth, [2]. In Malaysia, unlike in many other countries, more women than men seek postsecondary education, indicating that adolescent girls and women face less gender-based impediments to education. Unfortunately, women continue to face challenges on the job, with many of these competent workers leaving to care for their children on their own. This is a major reduction in the economy's ability to grow during a vital phase for individuals raising a family, [12].

STEM professionals, for Malaysia's transformation to developed status by 2020, will be dependent on capital, resources, and infrastructure. The administration also acknowledged that female participation in STEM-related areas is critical to meeting this nationwide objective, [13]. Female mentors are essential for encouraging female participation in STEM fields, [14]. Malaysia's lack of representation of women and girls in STEM-related fields has serious ramifications for economic growth and social development, limiting the country's ability to innovate, compete, and thrive in a rapidly changing global economy that increasingly relies on scientific and technological advancements.

## 2 Research Question and Aim

The research question, "What factors enhance and empower women/females in STEM education and jobs?" serves as the guiding inquiry for this study. The primary objective is to comprehensively investigate and understand the multifaceted factors influencing the participation and empowerment of women in STEM fields.

## 3 Methods

A Systematic Literature Review (SLR) was used in this study by using Procedure Research Inventory Systematic Material Analysis (PRISMA). The SLR perspective is a thorough and structured research approach used in academia and other fields to gather, assess, and synthesize current scholarly

literature on a specific topic, research question, or area of interest. Simultaneously, systematic reviews are mostly used for the analysis to determine what is known, what remains unclear, uncertainty surrounding findings, and recommendations for practices and future research, [15]. The stages of the systematic review research procedure are as follows:

a. Identification
The systematic review commences by doing a comprehensive search across many databases, including Scopus, IEEE Xplore, Google Scholar, Emerald, and ProQuest to locate and collect all relevant articles, conference proceedings, book chapters, and reports. The search terms used to find articles are "women in STEM education" and "STEM education and female students". The study identified a set of 648 articles where 300 are excluded from the sources due to duplicate records, as depicted in Figure 1.

b. Screening
The criteria are specified for including or eliminating papers based on their relevance, quality, and fit for the research topic. From the 348 articles identified from the sources, 200 articles were excluded based on title and abstract. The other criteria for article inclusion are i) related to female/women students in STEM education, ii) published in English, and iii) articles is open accessed.

c. Eligibility
To maintain uniformity in the handling of the documents, the articles were assessed by, [16]. However, the specific subject of this study was determined in the initial stage of analysis by conducting searches on titles, abstracts, and keywords that aligned with the research questions, while excluding irrelevant studies, [17]. 130 articles are excluded for i) non-scholarly paper, ii) not answering the research question, iii) review paper without any research design and sample of respondents, and iv) not fully accessed.

d. Included
Before the approval of the selected papers, the complete texts of the papers underwent careful examination and were extensively aligned with the current study throughout the eligibility phase. After the conclusion of each step, a total of 18 articles were selected from the final evaluation. 18 articles were used to identify the result of obstacles and challenges among women in STEM education.

The eighteen articles were selected from various countries including Spain, the United States, Germany, Bangladesh, Israel, Switzerland, United Kingdom. The authors put all the results in one table (Table 1, Appendix) to get more understanding of the results and conclusions obtained from these articles. Moreover, the author compiled the articles to build upon research in the field of this study especially to understand the situation about the participation of women/females among STEM education. By building upon the results based on assessment, there are three fields namely current situation talent pool, women in STEM education, and women in STEM career. The final step for this analysis is to report findings and discussion as the ultimate aim.

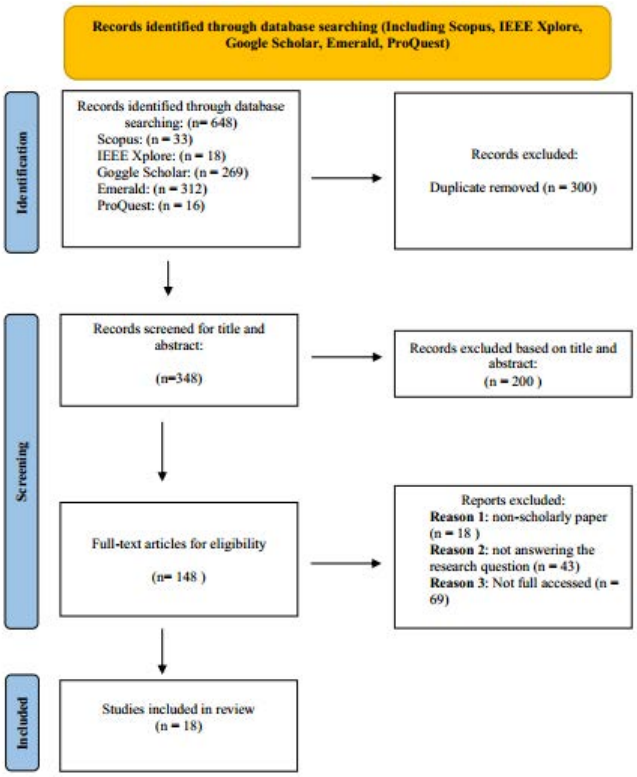


Fig. 1: The Process of Searching Articles

# 4 Results

The findings of this study were derived from a comprehensive analysis of 18 papers, resulting in the identification of three distinct categories about the factors influencing the current state of women in STEM education and occupation.

## 4.1 Current Situation Talent Pool

According to, [12], there is a significant disparity in employment rates based on education and gender

among women, particularly at the basic and secondary education levels (Figure 2). The employment rate for women is considerably lower compared to men in these contexts. Despite being the most advanced group at the postsecondary level, the current situation in STEM education requires increased participation from this group, [18].

Figure 3 illustrates the Human Capital Index for Malaysia about other Asian countries. It is evident that Malaysia's human capital is comparatively lower than that of Vietnam, Korea, Japan, and Singapore. This emphasizes the need to promptly adopt strategies to enhance human resources, particularly women, to stimulate economic development in the nation.

Furthermore, Malaysia's performance in knowledge worker preparedness has been inadequate from 2016 to 2020, despite improvements in higher education completion and knowledge absorption (Figure 4). Furthermore, it suggests that the industry cannot develop beyond its supplier network, [12]. There has historically been a lack of female students pursuing STEM courses at the university level, especially in the subject of engineering, [32].

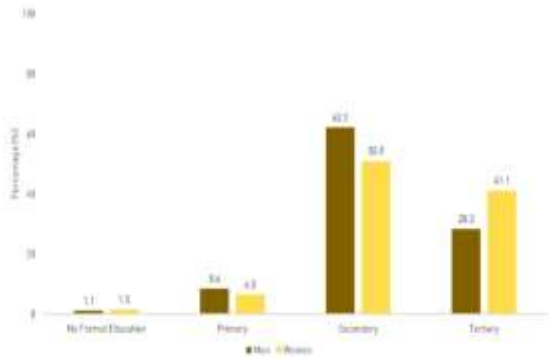

Fig. 2: Malaysian Employed Based on Education and Gender, [2].

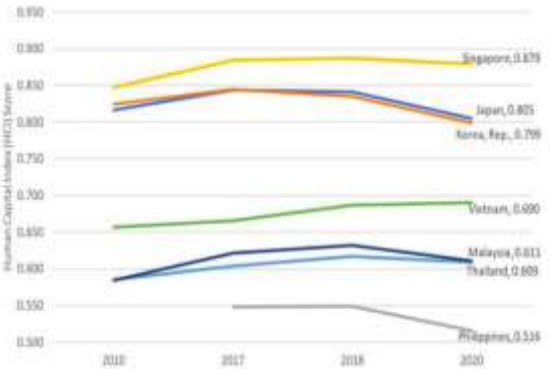


Fig. 3: Human capital Index Comparison against selected Countries in Asia, [2].

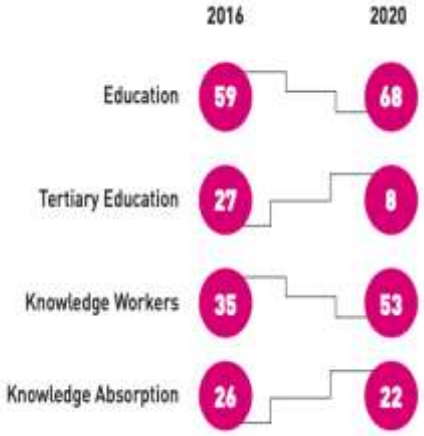


Fig. 4: Progress of Malaysian Talent Capital in the Global Innovation Index Report, [2].

Based on the analysis from the previous research in Table 1 (Appendix) represents how the problem of talent pool not only happen in Malaysia. The findings of studies on the current state of the STEM talent pool highlight the pervasive underrepresentation of women, and emphasize the resulting economic and social inequities, [10]. Examining the German context, [22], it discovered that ongoing national programs aimed at increasing women's participation in STEM, resulted in higher rates but ongoing challenges exist. Furthermore, global perspectives in most countries emphasize that, girls outperform boys in science, revealing a "gender-equality paradox" influenced by a variety of social factors, [26]. STEM programmes is contributing to higher female graduation rates in STEM disciplines, indicating concerted efforts to close the gender gap in the STEM talent pool, [27].

## 4.2 Women in STEM Education

The Malaysia Women Policy of 1989 was amended in 2009 and became the Malaysia Women Policy of 2009, [33]. This Policy maintains the original purpose set by the MWP in 1989, while also acknowledging and dealing with present limitations and challenges. The objective of the MWP 2009 is to enhance human capital by promoting women's competence, resilience, knowledge, innovation, creativity, and ingenuity while upholding moral norms. This strategy also encompasses measures to facilitate the readiness for a rise in female labor-force involvement, considering that women constitute 50% of the overall workforce, [33], [34].

These studies shed light on critical aspects of women's participation in STEM education. The effects of mentoring on female high school students

were investigated and found that they are more sensitive to STEM issues, [1]. Moreover, the challenges and opportunities for young female learners in Bangladesh were investigated and focused on the low proportion of female stakeholders in STEM fields, [18]. Other than that, the study shows how exposure to female role models and gender-equitable teaching strategies improved attitudes toward STEM and increased enrolment in advanced courses, [20]. Contrariwise, [25], adds to our understanding of the factors that influence young women's decisions to pursue computer science-related fields, highlighting the critical roles of encouragement and exposure in shaping these educational choices.

Developing inclusive and fair STEM education opportunities for women is crucial not only for achieving gender parity, but also for unleashing the complete capabilities of human resources, fostering economic advancement, and catalyzing innovation in the present era and beyond. Based on a few studies, women's earnings in STEM occupations are 10% lower than those of males, taking into account several career-related characteristics, [35], [36]. The drive to assess the present condition of STEM about girls and women has emerged due to ongoing concerns about the profession's sluggish progress towards achieving SDGs 4 and 5. These goals aim to promote gender equality and empower all women and girls, [2].

The recognition of poor self-esteem as a key factor in the declining interest of female students in STEM disciplines is growing. This is because low self-esteem can lead to a lack of confidence in their ability to succeed in these professions, ultimately resulting in lower levels of female participation and representation in STEM jobs. The most significant challenge for female STEM students is a lack of self-efficacy, [37]. Women with STEM careers are a substantially higher probability than professional women to quit their occupations, [18].

Female individuals holding STEM degrees demonstrated a higher probability of being engaged in occupations that include providing care, such as healthcare and education, during the initial and middle stages of their professional lives, [38].

The significance of female role models in empowering female students in educational institutions, such as schools and universities, cannot be exaggerated. These role models act as a catalyst for inspiration and motivation, encouraging young girls to actively pursue their aspirations and ambitions, [20]. The study found that female positive role models and gender equality lectures have a favorable impact on empowering women in STEM education, particularly in three key areas, [29]. Women who have degrees in STEM fields are more inclined to work in occupations that include caring for others, such as teaching and healthcare, during the early and middle stages of their careers, [21].

Intervention is required to create a family-friendly environment that is accepting and affirming of women who work and have a family, [39]. The significance of STEM-related parents' occupations in supporting women's participation in certain STEM professions is emphasized, [40]. The gender disparity in STEM education and employment is of ultimate importance due to the loss in abilities, perspectives, prospective advancements, and total workforce capacity, [2].

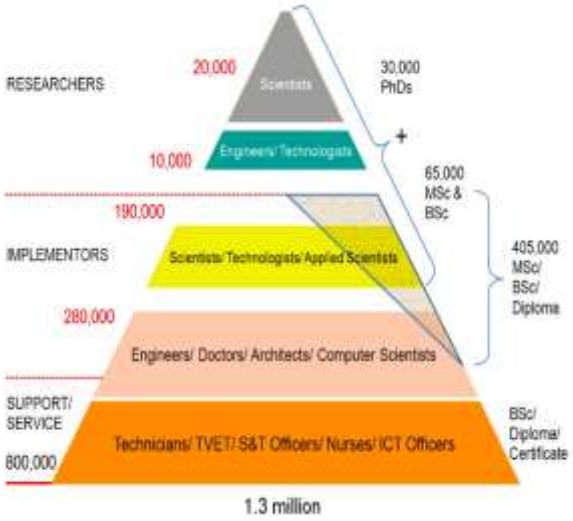


Fig. 5: Human Resources Development 2020, [2]

Figure 5 illustrates the government's objective to create 1.3 million STEM employment across many industries by 2020. Additionally, it aims to develop infrastructure and promote the establishment of industrial clusters. To address the challenges and objectives of a knowledge-based economy in 2020, Malaysia places a high emphasis on STEM education as a means of attaining the needed quantity of STEM workers. Women, being roughly 50% of the population, are underrepresented in the labor force.

### 4.3 Women in STEM Career

STEM occupations are currently marked by an increasing need for skilled professionals and a significant shortage of qualified individuals to occupy these roles. Consequently, there is a demand for taking action to tackle these difficulties and foster increased diversity and inclusivity in STEM professions. Women in STEM professions earned a

salary that was 33% higher compared to women in non-STEM fields, [41]. This skills gap has created a challenging scenario for employers, as they struggle to recruit and retain talent in a highly competitive job market. Additionally, the STEM workforce is lacking in diversity, with marginalized groups such as women and minorities disproportionately underrepresented.

The availability of female role models in STEM higher education careers is concentrated, emphasizing the importance of role models in addressing women's underrepresentation, [14]. Otherwise, it revealed differences in obtaining graduate-level employment and managerial positions when compared to their male counterparts to investigate the career paths of female STEM graduates in the UK labor market, [21]. Other than that, the study found that women in STEM have lower self-efficacy during college and discussed factors such as interest and occupational selection that influence women's decisions to pursue STEM majors, [29]. Additionally, women's retention in STEM and professional occupations compared and unfolded a trend in which women in STEM are more likely to leave the field early in their careers, underlining the need for additional research into retention factors, [31].

The rising competitiveness among STEM students has resulted from the increasing demand for STEM jobs, underscoring the significance of continuous learning and the development of new skills to remain competent in the sector. STEM students displayed greater mathematical proficiency and emphasized the relevance of participating in research activities, [42]. STEM is integrally linked to Malaysia's economic development to generate prosperity and prepare the country to become a developed country through 2020, [32]. Female community-based university STEM students have educational and career aspirations, as well as discovering interactions and experiences with, [42]. Female educators can exert a substantial impact in motivating women to seek and excel in fields where women are underrepresented, as stated in reference, [43].

Addressing the gender gap in solving equity problems among female students in STEM requires creating a supportive and inclusive environment in both the workplace and college. Improvements in the workplace and educational environment are required before women can fully engage in engineering and computing careers, [44]. Community colleges also educate the forthcoming generations of female scientists, engineers, and mathematicians, [45]. Empowering women in STEM requires collective action and cooperation among all parties, including society and community, to break down barriers and promote gender equality in education and the workforce.

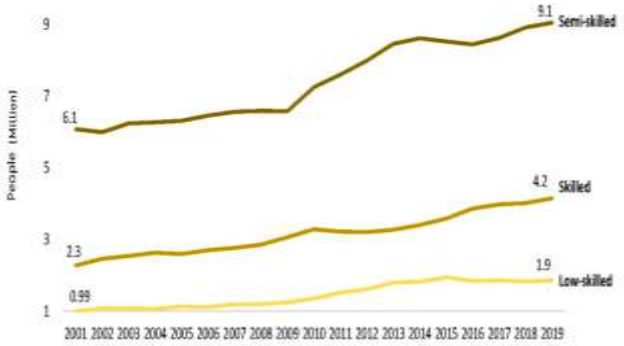


Fig. 6: Employed Individual by Skilled Occupation 2001-2019, [2.

Meeting the demand for skilled labor in STEM fields in Malaysia is crucial, and empowering more women to pursue and surpass these careers can help address the skills gap and promote economic growth and innovation. The Policy intends to appropriately strengthen women in STEM so that they can compete and are not side-lined in national growth, [32]. According to Figure 6, the majority of Malaysian jobs are semi-skilled, meaning that Malaysian industries operate at the middle to bottom of the global value chain. Malaysia's productivity suffers as a result, and the country is trapped in the middle-income trap, [12]. Establishing a STEM orientation amongst young women can help to enhance their social identity viewpoint for careers in STEM disciplines. When young women are exposed to STEM environments, they face barriers to participation and inclusion, [46].

# 5 Discussion

Malaysia has significant gender disparities in STEM education and jobs, emphasizing the critical need for targeted initiatives to close these gaps. This article investigates effective solutions for reducing disparities and promoting gender equality in STEM disciplines. Several issues are discussed, including the role of industry engagement, government policies, problems and opportunities, educational changes, role models, family-friendly initiatives, and changing social norms and stereotypes.

Industry engagement and collaboration: The industry's role in promoting diversity and inclusivity in STEM professions is discussed, with an

investigation into how collaboration between educational institutions and industries can open up more opportunities for women in STEM. This collaborative approach seeks to make the STEM workforce more inclusive and supportive.

Government policies and initiatives: The role of government policies, such as the Malaysia Women Policy of 2009, in encouraging women to pursue STEM careers is critical. Figure 6 depicts the effectiveness of the government's goal of creating STEM jobs and developing infrastructure, revealing the impact of policy initiatives on the ground.

Problems and opportunities: It is critical to identify the challenges that female STEM students and professionals face. The article also discusses the promising outcomes of increasing women's representation in STEM, highlighting the positive impact on overall workforce capability and future breakthroughs.

Educational reforms: Examining the need for educational reforms, particularly at the K-12 and university levels, becomes critical in encouraging more female students to pursue STEM courses. Addressing the underlying causes and instituting inclusive educational practices can pave the way for a more gender-balanced STEM landscape.

Role models and mentoring: The significance of female role models in STEM is investigated, with a focus on how they inspire and motivate young girls to pursue STEM careers. Furthermore, the discussion includes mentoring programs that involve both students and industry professionals, to determine how such initiatives can provide critical support for female STEM students, using multimethod approaches as used in previous researches in varied investigations fields, [47], [48].

Family-Friendly policies and their economic consequences: The significance of creating a family-friendly environment for working women with families is discussed, as well as an examination of how the careers of STEM-related parents influence females in STEM engagement. Examining the economic consequences of gender disparities in STEM fields, such as the skills gap and productivity issues, sheds light on the broader implications for Malaysia's position in the global value chain.

Changing social norms and stereotypes: Societal norms, gender roles, and cultural values all have a large impact on Malaysian women's decision to pursue STEM careers. The significance of breaking down gender stereotypes in mathematics and science is stressed, as well as creating an environment that encourages more women to pursue STEM degrees.

# 6 Conclusion

Ultimately, this research emphasizes the significance of tackling the disparity in gender representation in STEM education and employment opportunities in Malaysia. This study offers valuable insights into the barriers and possibilities of achieving gender equality in STEM fields by investigating the factors that impact female students' attitudes and involvement in STEM education. The study's findings have substantial ramifications for policymakers, educators, and other stakeholders who are invested in promoting gender equality in education and the workplace.

Policymakers may promote the development of inclusive and equitable education systems that stimulate creativity, innovation, and economic growth by tackling the cultural, social, and institutional obstacles that impede female students' involvement in STEM disciplines. Moreover, this study establishes the foundation for forthcoming research that will build upon these discoveries and explore novel avenues for enhancing gender parity in STEM education and occupations in Malaysia. Furthermore, it highlights the significance of cooperation among governmental entities, educational establishments, and industry collaborators in tackling the systemic elements that contribute to the underrepresentation of women in STEM careers.

In conclusion, this study displays the imperative of promoting gender equality in STEM disciplines, not just for the advancement of women themselves, but also for the overall betterment of the economy and society. By promoting the advancement of women in STEM fields, we can cultivate a workforce that is more diverse, inclusive, and innovative, therefore equipping it to effectively tackle the problems of the twenty-first century.

*Acknowledgments:*
The authors would like to acknowledge the financial support of the National Funds provided by FCT—Foundation for Science and Technology to VALORIZA—Research Center for Endogenous Resource Valorization (project UIDB/05064/2020).

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# APPENDIX

Table 1. Women/Females in STEM Fields

| No | Author(s) | Title | Methods | Sample | Findings |
|---|---|---|---|---|---|
| 1 | [1] | Mentoring female high school students for a STEM career. | Quasi experiment | - Mentors (University students)<br>- Mentee (Student aged between 15-16) | The main findings were that there was a lot of interest in the mentors' talks, with male students paying more attention and being more open to questions and interventions. Furthermore, despite low participation and interest in the topics discussed, there was a surprising sensitization of the female group to STEM issues. |
| 2 | [8] | The roles of teachers, classroom experiences, and finding balance: A qualitative perspective on the experiences and expectations of females within STEM and non-STEM careers. | Qualitative | N = 60 | The influence of family and work/life balance on career decisions. The impact of teachers and classroom experiences on career aspirations. STEM subject interest and perceived value as a factor in career decision-making. |
| 3 | [10] | Growing the roots of STEM majors: Female math and science high school faculty and the participation of students in STEM | Quantitative | N = 21, 340<br>(9, 320 young men)<br>(12, 020 young women) | The underrepresentation of women in science, technology, engineering, and mathematics (STEM) fields is problematic because of the economic and social inequities it fosters, as well as the growing global importance of STEM occupations. Although the proportion of female math and science teachers at a school does not affect male students, it has a significant impact on female students' likelihood of declaring and graduating with a STEM degree, with the effects being greatest for female students with the best math skills. |
| 4 | [14] | Providing female role models in STEM higher education careers, a teaching experience. | Quantitative | N = 205 female bachelor degree student | Emphasizes the underrepresentation of women in STEM careers and the importance of female role models in broadening participation in these fields. It also highlights initiatives aimed at empowering female students and shattering sexist stereotypes. |
| 5 | [18] | Challenges and opportunities for young female learners in STEM from the perspective of Bangladesh. | Qualitative | N = 100 female students with three teachers as a mentor | The main findings are the low percentage of female stakeholders in STEM fields in Bangladesh, the visibility of gender disparity from the beginning of the educational journey, and the specific gender disparity in the Mathematics Olympiad. |
| 6 | [19] | The gender gap in STEM fields: The impact of the gender stereotype of math and science on secondary students' career aspirations. | Cross-Sectional Study | N = 78 of Swiss secondary school student | Maths is thought to be the most masculine subject, followed by physics and chemistry. While male students rated all subjects equally strongly as masculine, maths is significantly more strongly associated with masculinity than chemistry and physics. In terms of masculinity attribution, chemistry and physics do not differ significantly. |
| 7 | [20] | Women in STEM: Female role model and gender-equitable teaching strategies. | Observational study | 89 samples of young women in elective secondary (9-12 years) | Female students' attitudes towards STEM improved after they were exposed to female role models and gender-equitable teaching strategies. More female students chose advanced STEM courses this year than in the previous two years. Participants expressed increased optimism and hope for the future. |
| 8 | [21] | From subject choice to career path: Female STEM graduates in the UK labor market. | Mix-method | N = 17,000 | Female STEM graduates were less likely to obtain graduate-level employment, work in HS STEM jobs, or hold managerial positions than their male counterparts. Gender differences in the relationship between the degree subject studied and occupational outcome were observed. A STEM degree |

| No | Author(s) | Title | Methods | Sample | Findings |
|---|---|---|---|---|---|
| | | | | | was more important for women than men in terms of gaining graduate level employment and working in an HS STEM role, but it was associated with a lower likelihood of working in a managerial or professional role. |
| 9 | [22] | Gender and STEM in Germany: Policies enhancing women's participation in academia. | Quantitative | N = 4,663 | In Germany, national programs to increase women's participation in STEM fields have been established, resulting in increased participation rates but remaining low. Initiatives to attract women to STEM fields have a positive influence on female students' decisions to pursue STEM fields, but they have a low level of professional integration. Women are underrepresented in STEM fields, with the greatest drop occurring during habilitation. However, the proportion of women decreases only by six percentage points from first-year student to professor. |
| 10 | [23] | Majoring in STEM what accounts for women's career decision making? A mixed methods study | Mix-method | N = 843 female high student | The findings revealed a high level of persistence in students' intentions to pursue a career in STEM fields. In comparison to students who majored in the social sciences or humanities, STEM students demonstrated stronger mathematical skills and a preference for engaging in investigative activities. According to qualitative analysis, learning experiences, parental support, and role models influenced female students' choice of studies. |
| 11 | [24] | Is it a Female Role-Model Thing | Quantitative | 304 girls from 12 years (sixth primary grade) to 16 years old (fourth secondary grade) | The main findings are that girls' expectations of success in maths, enjoyment of maths, and importance of maths, as well as their likelihood of choosing a STEM career, are significantly increased by exposure to female role models in STEM fields. The research will help the Inspiring Girls Foundation (IGF) improve the effectiveness of its role-model program right away. The study demonstrates the role-model sessions' effectiveness in reducing gender stereotypes, increasing enjoyment and importance-related values, and strengthening the direct effect of success expectations on girls' STEM choices. |
| 12 | [25] | Gender Differences in Factors Influencing Pursuit of Computer Science and Related Fields | Quantitative | N = 1,739 | Encouragement and exposure are the most influential factors in young women's decisions to pursue computer science-related fields, with social encouragement being significantly stronger for women than for men. The majority of decisions about pursuing computer science-related fields are made before a young woman begins college, demonstrating the importance of pre-college experiences in influencing this decision. |
| 13 | [26] | The Gender-Equality Paradox in Science, Technology, Engineering, and Mathematics Education. | Quantitative | N = 472,242 (67 Nations) | In most countries, girls performed similarly to or better than boys in science - The educational gender equality paradox is driven by both distal and proximal social factors. Countries with lower levels of gender equality had more women among STEM graduates than countries with higher levels of gender equality. |
| 14 | [27] | Gender Diversity in STEM Disciplines: A Multiple Factor Problem. | Quantitative | N = 11,809 | The program has contributed to higher female graduation rates, particularly among Bachelor students, and has increased the number of faculty women in positions of |

| No | Author(s) | Title | Methods | Sample | Findings |
|---|---|---|---|---|---|
| | | | | | power. On average and year after year, the ETSE-UV is higher than the Spanish reference value. The ETSE-UV has an average value of 15.12% graduated female students, which is higher than the Spanish reference values. |
| 15 | [28] | Encouraging Girls into Science and Technology with Feminine Role Model: Does This Work? | Quasi-experimental | N = 90 | The program aimed to encourage girls in Israel to pursue STEM careers. The findings indicated respect for women scientists as smart and creative, but a significant negative change in perceptions of women scientists/engineers, STEM capability, and STEM career options. The paper discusses possible explanations for these findings as well as their educational implications. |
| 16 | [29] | The STEM Pathway for Women. | Quantitative | N = 360 | In college, women had lower self-efficacy in STEM, and fewer women chose STEM majors. For both men and women, interest was a major factor in occupational selection. Women outnumber men in fields such as biology, while men outnumber women in fields such as engineering and physics/astronomy. A higher proportion of older women stated that they left STEM because of a lack of flexible hours and the need to attend to family responsibilities. |
| 17 | [30] | Returning from earning: UK graduates returning to postgraduate study, with particular respect to STEM subjects, gender, and ethnicity | Mix-method | N = 22,207 | Graduates returning for taught postgraduate study do so primarily as a result of underemployment following graduation. STEM graduates were far less likely to pursue taught postgraduate studies. |
| 18 | [31] | What's So Special about STEM? A Comparison of Women's Retention in STEM and Professional Occupations. | Mix-method | N = 1,258 | The findings show that women in STEM occupations are significantly more likely than professional women to leave their occupational field, particularly early in their careers, and that job characteristics cannot account for the disproportionate loss of STEM workers. According to the paper, future research should concentrate on the first few years of employment in STEM jobs. |

**Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)**

The authors equally contributed to the present research, at all stages from the formulation of the problem findings to the final findings and solution.

**Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself**

No funding was received for conducting this study.

**Conflict of Interest**

The authors have no conflict of interest to declare.

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