

## The STEM gap: Overcoming obstacles and incorporating women globally

N. Lohgheswary<sup>1</sup>, Leelavathi. R<sup>2\*</sup>

<sup>1</sup>Faculty of Engineering and Science, University of Greenwich, Kent, ME4 4TB, United Kingdom.

<sup>2</sup>School of Computing and Informatics, Albukhary International University, Malaysia; leelavathi.rajamanickam@aiu.edu.my (L.R.).

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**Abstract:** This paper discussed two issues involving women in STEM. The first issue is why are women avoiding STEM fields. A framework illustrated that personal factors, environmental factors, and behavioural factors are the three factors that push away women from STEM. Personal factors include girls who are better in language skills and discourage them from choosing STEM subjects. Environmental includes the thought of STEM is highly factual and far away from the current trends. Behavioural factors include the aspirations of women to choose careers to support others. Connections, Opportunities, Growth Mindset, Stereotypes, Collaboration, and role models are ways to enhance women in STEM. Industry partnerships with educational institutions will increase female students' interest in STEM. One way to deal with gender inequality is to work with young children using statements from the current statistics to start conversations in the classroom. The Science Olympiad and other national competitions have shaped the interests and skills of 21st-century female students. Educators and activists continue to influence the media, corporations, and educational institutions to present and recruit women in all STEM occupations. More women should join the STEM field to reduce the gender gap.

**Keywords:** Gap, Incorporating, STEM, Women.

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### 1. Introduction

One of the main points of contention in the business sector has been the unequal representation of men and women in STEM fields. Whether it's on the Oscar stage, in politics, on TV, or in the office, disparities are brought out, and conversation always follows. This was most shown by the contentious "Google memo," authored by former Google employee James Damore, who questioned the extent to which workplace harassment contributes to gender disparities in STEM professions [1]. A contentious discussion about the causes of sex disparities in human behavior and STEM gaps was triggered by the letter and Damore's subsequent dismissal from Google.

There is a need to boost the number of people studying and working in STEM-related fields because these industries are viewed as crucial to both the present and future economies. This study will go over why women are discouraged from pursuing careers in STEM and provide a framework for increasing women's participation in the field.

While the number of future STEM professionals is a topic of constant discussion, businesses and the government are more concerned about the growing gender disparity in STEM skills [2-5]. In the fields of engineering and physics, the disparity is especially noticeable. The World Economic Forum's (WEF) Global Gender Gap Report [5] states that women are underrepresented in STEM professions and males are underrepresented in the areas of education, health, and welfare. In comparison to the US and other European countries, the UK exhibits this underrepresentation [6]. The percentage of professional

women engineers in the United Kingdom (England, Scotland, Wales, and Northern Ireland) is only 11%.

STEM education is the study of [...] teaching and learning in the fields of science, technology, engineering, and mathematics [...] including educational activities across all grade levels, from pre-school to post-doctorate, and both formal and informal classroom settings [7].

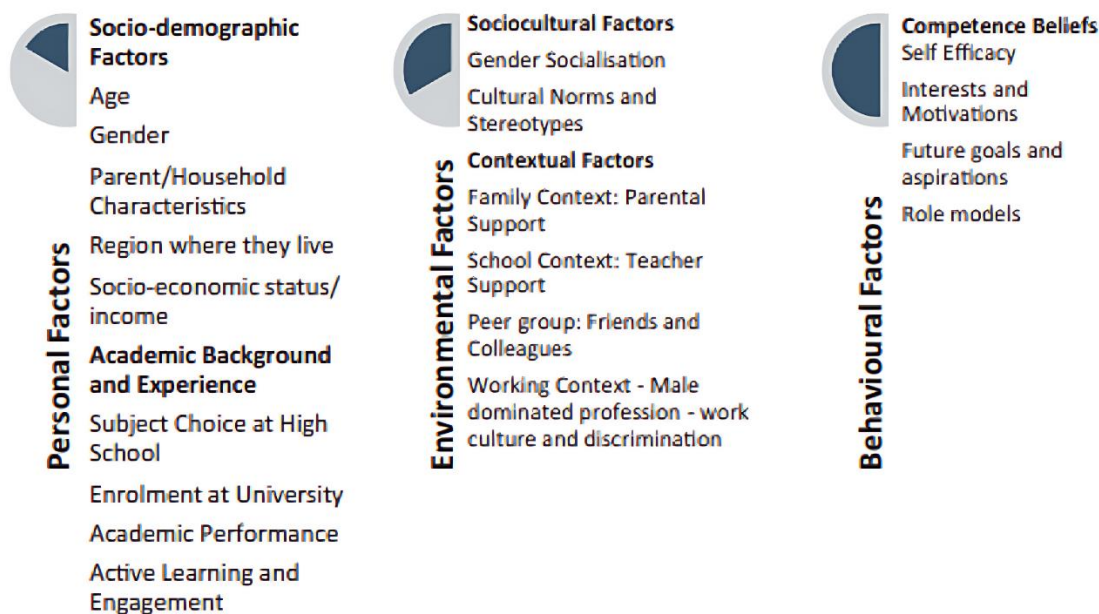
Secondary STEM education offers electives that allow students to go further into scientific and math subjects and have a deeper understanding of engineering and technology [8].

Gender disadvantages still exist, even though during the past 40 years, gender equality in science has greatly improved, mostly in Western countries. There are still differences between the sexes when it comes to how science is viewed by students and how many of them choose to become scientists. Women from underrepresented racial and ethnic groups are more likely to drop out of STEM degree programs, even at the admissions stage.

## 2. Why do Women Avoid STEM Fields?

Regarding the reasons why students drop out of STEM courses and why women are more likely to do so, education psychology and education have differed. The gender gap has narrowed over the last 20 years, with discipline-specific differences [9]. There have been several explanations offered for the gender gap, including those based on lifestyle values, absolute and relative cognitive strengths, hobbies, and domain-specific views [9]. They might all be a part of a "leaky pipeline" that, once their careers start, keeps young women from moving up in STEM professions.

The framework [10] is used to divide the reasons why women don't pursue careers in STEM into three groups. The elements fall into three categories: behavioral, environmental, and personal. The framework for the gender gap in STEM education is presented in Figure 1.



**Figure 1.**  
Gender disparity framework in STEM education.

### 2.1. Personal Factors

When it comes to verbal aptitude tests, men tend to fare better than women, and in mathematical aptitude tests, the opposite is usually true. The gender similarity theory, which states that most psychological traits, aptitudes, and abilities are more similar than different between genders was

proposed [11]. Additional study indicates that those with high verbal and high mathematical aptitude are less likely than those with moderate verbal and high mathematical aptitude to choose STEM careers, which lends credence to this thesis [12]. There are more girls than boys among these math and language high achievers. Girls' aptitude in language skills may discourage them from pursuing jobs in STEM fields.

It's interesting to note that not enrolling in STEM courses is also influenced by math phobia. The perception that mathematics is a frightening topic with an excessive number of formulae and phrases contributes to girls' reluctance to enroll in STEM programs. Additionally, studies have shown that girls experience more arithmetic anxiety than boys do [12]. This could be a result of being fearful of making mistakes. Math requires a great deal of repetition. It is not a subject that requires reading and comprehension. The more a learner practices and makes mistakes, the more their knowledge will grow. Hence, selecting a non-STEM course may help girls who have anxiety related to arithmetic in both elementary and secondary education.

In Germany, there is a distinct situation when high school graduates choose their university major based on the courses they take. It follows that high school students are under pressure to select their specializations as soon as possible [13]. Course selection in high school is predictive of course choices in college. This serves yet another justification for discouraging women from selecting STEM as their university major. Conversely, though, females who perform well in STEM classes in school—such as science and math—are also more likely to select STEM majors in college.

## 2.2. Environmental Factors

Studies reveal that a lot of school dropouts don't think about going into STEM fields since they don't think these fields are "for me" [2]. This is because STEM disciplines are highly factual and have little to do with current trends. Business and economics topics are closely related to our daily lives since obtaining money requires hard effort and is necessary for survival. These courses will educate students on how to earn money through a variety of methods. Students can therefore connect those topics to life's purpose.

The worst situation is when women don't think about many options in STEM courses because they don't know about them, have limited or no access to them, or aren't encouraged to think about a range of options when taking STEM courses. The lack of information about the various possibilities for courses to take from high school to a university degree from the school, parents, and local councils is the cause of the ignorance. When selecting their possibilities for additional education, students rely solely on media representations and career fairs. Many options might not always be considered since women don't always think that a particular decision will fit nicely with their gender roles or other social norms.

The expectations of teachers influence girls' decision to pursue STEM subjects. Boys are considered "naturally bright," while girls are considered "hard work," although boys' test scores are just marginally higher than girls'. Young women are less likely to be encouraged to seek jobs in the physical sciences by their teachers, families, and friends. The primary reason for this misperception is that teachers are not as familiar with STEM careers. In engineering, it is occasionally required to perform strenuous tasks that are often associated with men, like as lugging or lifting machinery or ascending to a certain height. But women are equally capable of handling such responsibilities.

Young women are less likely to characterize themselves as "good" at science and to exhibit less confidence in their abilities, regardless of their actual talents and accomplishments [2]. Society considers science to be a manly, high-status discipline best suited for middle-class males. This is just one more thing that deters women from pursuing jobs in science, both directly and indirectly.

Moreover, according to the cue hypothesis, threatening situational cues might reveal whether stigmatized groups are valued in a certain environment [14]. Fear-inducing indicators such as the dearth of female role models in STEM fields and the "bro" culture in STEM fields [15] make women feel as though they don't belong and lead to subpar performance in the STEM pipeline [16]. We hypothesized that a STEM professor's mentality toward intelligence—specifically, whether they believe

intelligence is a fixed or flexible skill—acts as a situational cue that reinforces gender stereotypes and makes it more difficult for women to succeed in STEM courses.

The connection between masculinity and STEM and how it prevents women from becoming familiar with it has been the subject of numerous research [2, 3]. To bridge the identification gap, some women who are still involved in STEM fields use certain strategies. For example, women who work in mathematics have created a tactic called "bifurcation" to disassociate themselves from the stereotypical ideas of femininity in mathematics.

The propensity of young women identifying as Physics majors to characterize themselves as "for boys" or unfeminine serves as another example [2]. In actuality, understanding abstract notions in physics is more difficult. Therefore, one must learn logic and mathematics to relate to the theories and then understand those notions. Therefore, the ability to understand and apply physics theories is more important than masculinity.

Gender differences in preferred jobs are a result of socialization to gender roles. Women are more drawn to hobbies and careers that include people and interpersonal relationships, whereas men are more likely to be interested in jobs that involve manipulating concrete objects and abstract concepts [17]. One illustration of this is the significant female dominance in the fields of teaching and nursing. However, in the last ten years, these conditions have evolved. Both genders are dominating in the teaching profession. This also applies to university lecturers.

However, following some research on gender inequity, several academics express differing opinions. Many believe that the increase in the proportion of women working in fields like life science is proof that equality has improved [15, 18, 19]. Psychological research has demonstrated that improved representation can lead to better performance for women, particularly in STEM fields. This includes a sense of belonging and a desire to participate [20, 21]. Furthermore, studies consistently demonstrate that gender stereotypes about science are less common in countries with higher representations of women in the sciences [22]. This is because people tend to attribute gender stereotypes to those who hold such positions. After all, men and women are not equally represented in the workforce [23]. However, positive gains in representation shouldn't always be taken as a guarantee of gender equality.

Undergraduate biology students in the study [24] continued to exhibit gender bias by underestimating the skills of the female students in the class. This was noteworthy since it was placed in an industry where women currently outnumber men nationally. More broadly, gender stereotypes such as the idea that women have "relative cognitive strengths" in math when compared to men can sometimes be used to "explain away" differences in representation in specific STEM fields, like the life sciences [25]. For women who have left their jobs to pursue STEM careers, there is an additional compelling incentive. The employment prospects of newlyweds were examined following the birth or adoption of their first child [26]. The survey states that 23% of men and 43% of women quit their full-time jobs in STEM disciplines after delivering their first child. It is difficult to balance STEM work with caregiving responsibilities in general, as evidenced by the higher likelihood of new parents leaving full-time STEM jobs compared to their childless peers who are otherwise similar. Even new parents who remain unemployed full-time are more likely to leave STEM for work elsewhere.

Choosing STEM fields is based more on personal interest than on gender norms. This curiosity is sparked by encouragement or supportive guidance from educators and parents. A youngster will begin to develop an interest in a subject when a parent introduces it and spends time with them discussing it. The same holds for educational institutions. Students will find a subject more engaging when it is taught in a more participatory manner.

### 2.3. Behavioural Factors

The conviction in one's mathematical ability may be another factor behind the dearth of women in STEM disciplines. A person's belief that they can effectively finish a task is reflected in their anticipation of success. Research indicates that self-belief has an impact on good educational outcomes. In addition,

boys are more likely than girls to have a good self-concept or success expectation in mathematics. Self-belief is correlated with the likelihood of enrolling in STEM programs at universities [12].

The expectancy-value theory highlights the importance of value judgments in deciding a person's educational and career route [12]. Students are more likely to enroll in STEM courses if they believe science and math to be interesting and engaging. We refer to these as inherent values. Students can stick with a task for a long time when they see intrinsic worth in it. The main cause of gender disparities in STEM is differences in interests.

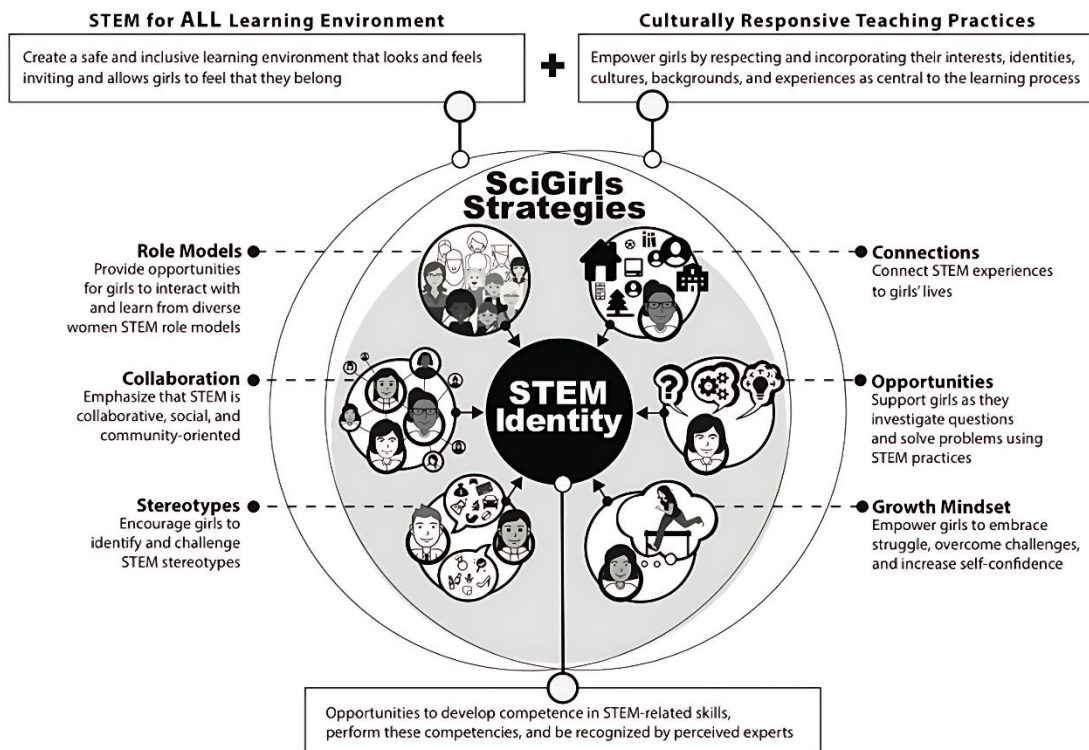
Extrinsic motivation is also a factor that female school dropouts consider when selecting their professional subjects. One example of extrinsic motivation is the compatibility of subjects for intended university degrees and careers. This was shown to be the most important factor to consider when choosing the subjects for more research. People are most likely to choose a major if they feel they can succeed in it and it has a high task value for them [17]. After reading this, female students concluded that pursuing professions in STEM fields was not the right choice for them. As a result, they have no intention of studying STEM [3]. It's possible that STEM careers don't match kids' true goals.

Another reason why young women choose not to enroll in STEM courses is the expense of doing so. In this context, "cost" refers to the resources that must be given up as well as the amount of labor required to complete a task. Giving up social gatherings with friends to concentrate on chemistry exam preparation is one example. A long-term investigation on students who plan to abandon their chemistry degrees because they believe the work will be too expensive [12]. In addition to time and effort, the cost of effort also includes missed opportunities, stress, and anxiety. However, it is unacceptable to claim that women shun STEM because of the expense. Boys enjoy going on trips with their mates too. This case affects just one research cohort. A finding on the cost may influence a STEM career choice if additional comparable research is carried out and the results are consistent.

Another interesting conclusion is that women are more likely than males to favor occupations that support their aspirations for family duties and that help others. Women are overrepresented in the fields of education (pedagogy) and healthcare (nursing and primary care). While women are becoming more prevalent in fields including law, medicine, engineering, science, and technology—which are traditionally dominated by men—this situation has been seen throughout the world [27]. In contrast, men are more likely than women to pursue well-paying jobs that provide opportunities for fame and fortune.

### 3. Enhancing the Status of Women in STEM

The framework in Figure 2, highlights six elements for enhancing women's participation in STEM [28]. Role models, growth attitudes, opportunities, stereotypes, and role links are some of them. Making connections entails relating girls' lives to STEM activities. Opportunities entail helping girls ask questions and use STEM methods to address challenges. Having a development mentality entail giving females the confidence to face obstacles head-on, rise above them, and enjoy the battle. Girls should be encouraged to recognize and confront STEM prejudices. Collaboration entails highlighting the collaborative, social, and community-oriented nature of STEM. Girls should have the chance to engage with and learn from a variety of diverse female STEM role models.



**Figure 2.**  
Six themes to increase the participation of women in STEM.

### 3.1. Connections (*Link STEM Experiences to the Lives of Girls*)

Incorporating resources on STEM occupations into classes is a potentially very successful strategy to encourage women to choose STEM majors in college. It is therefore necessary to take this stage for A-level topics. For instance, in advanced Physics courses, the book's introduction needs to discuss a career in Physics. Students will be drawn to study A-level Physics and decide between Physics and Engineering at the university level by a good, colorful graphic with a quick explanation.

The dot-com era has also aroused the interest of both sexes in technology through computer games. In Gen Z, both boys and girls are equally drawn to computer games, but in Gen Y, computer games were first mainly appealing to guys. They learn a lot about computers, some of the software, and some of the hardware through playing video games. They have instant access to data. Therefore, there provides an additional avenue for female students to select STEM programs for their postsecondary education.

### 3.2. Opportunities (*Assist girls in Applying STEM Methods to Research Issues and Find Solutions*)

Improving entry into STEM disciplines can be achieved, in part, by encouraging more people to choose STEM-related careers and increasing interest in these subjects. It is feasible to increase access to STEM careers and higher education for several reasons. One of the reasons for this is that STEM fields pay relatively high salaries. Another is that citizens understand and influence scientific advancements in society in their capacity as civilians. There are arguments that state science teachers have a greater social standing. Accordingly, scientific knowledge is an asset that improves a person's social status, allows them to participate in civic discourse, and boosts their earning potential at work [2].

Industry partnerships with educational institutions will increase female students' interest in STEM. A case study example was given, which involves instructing a female-only secondary school student in "An Introduction to Engineering course." After the students visited a power plant, they were given an



issue to tackle. To solve a particular problem, students can choose to conduct research in groups or individually. Subsequently, the students had to produce a report summarizing their experience working on the project and propose a solution to the problem. Students' cognitive capacities increased, and they adopted a positive attitude toward engineering [27].

Collaborations between academic institutions and educational institutions will also push female students toward STEM courses. Through a collaboration between the University of Colorado and the St. Vrain Valley school, basic engineering is taught. Together, the lecturers at the university and the schoolteachers developed an engineering project that can be repeated as a pre-university project for students from underrepresented categories. The program's goal was to encourage students to enroll in engineering courses at the university. The students gave the program positive feedback about how they felt about engineering and how prepared they were for it [27].

### 3.3. Growth Mindset (Empower Females to Rise to Obstacles, Accept Hardship, and Develop Self-Confidence)

It's important to confront how some STEM courses, like physics, are stereotyped as being difficult and reserved for men. Certain organizations have adopted this aim by portraying Physics as an approachable subject instead of a challenging one. Using an application or reasoning question at the beginning of a topic is another technique to demonstrate this. The topic should only be introduced with the theory, justification, and additional examples. This will pique kids' interest in physics since they, especially girls, will be curious about the motivations underlying everyday events.

The alternative is to disprove the notion that STEM subjects are difficult and demanding whenever it is raised by peers, coworkers, the media, or institutional policies. This might be accomplished by outlining the reasons STEM disciplines are simple to comprehend as well as the connections between STEM subjects and both nature and humans. We can only enhance student engagement in the STEM fields—especially among women—by taking this disruptive approach.

Compared to men, women who just graduated from engineering are less confident in their technical knowledge and abilities [6]. A shift in the curriculum is required to increase the degree of confidence. This has been put into practice in certain universities. The qualities that can boost female students' self-confidence are teamwork and communication. Working on creative projects with a group of peers from the first to the last year allows female students to constructively connect with male students, learn from them, and contribute to the project. They will also become a better team leader and communicate more effectively as a result. These qualities will also assist female students in doing well in interviews for jobs.

Children's participation in these groups affects their math and science proficiency. influence students' academic progress in addition to keeping them in STEM professions. Over several years, participating in these groups' weekly events has fostered an indirect interest in the STEM fields. This is because more female students are participating in STEM courses in higher education due to the thrill and delight of finishing the task and looking forward to the next week's new activity. An engineering club at school will encourage pupils to choose engineering for their A-level and STEM-related university courses, as engineering is now offered as an elective for Year 9 students in the UK.

Teachers can inspire more girls to pursue STEM-related fields of study by identifying the children who can perform STEM [6]. Teachers can identify a student's many skills starting in Year 7. This is not the same as teachers helping kids. Students' cognitive abilities will be improved in the classroom by talking about practical applications of STEM. The introduction, problem statement, methods, findings, discussion, and conclusion should all be covered in detail when discussing applications. Women will be inspired to pursue STEM courses in higher education by this educational opportunity.

Because of 141 years of British colonization in Malaysia, the educational system there is identical to that of the United Kingdom. Primary education extends from years 1 through 6, while high school spans years 7 through 13. In Malaysia, students take Malay, which is their official language, and their mother tongue language (Tamil, Chinese, or Sikh) as supplementary topics for GCSE exams, unlike in the UK, students take French and Spanish. The government has instituted Technique and Vocational

Schools in Years 10 and 11 as one of its efforts to promote STEM education among pupils. Students can elect to attend this school as soon as they graduate from Year 9. The focus of these institutions is engineering and design education. These pupils will continue to use the same exam board as their counterparts at public schools. These schools' students will inevitably select engineering as their university major. Through this government campaign, female students are being indirectly recruited into STEM areas, specifically engineering.

### *3.4. Stereotypes (Inspire Girls to Recognize and Dispel STEM Stereotypes)*

Gender inequality is one factor that discourages women from pursuing careers in STEM. One way to deal with this is to work with young children, using statements from the current statistics to start conversations in workshops, youth groups, and classrooms. It works well to analyze and break down literary examples on gender construction through thoughtful group discussions. When applied to issues of gender and science access, this will be very helpful.

STEM groups are paying more and more attention to equity in visual depiction. Men are frequently portrayed as the only ones who work in STEM fields. Civil engineering or building could be a prime illustration. In the building site, one frequently sees a few men in safety boots and headgear. This misconception will lead young females to believe that engineering is a male domain. This has to be altered as a result. In all STEM fields, women need to be represented on par with males.

Teachers must excite students by dispelling all of these negative perceptions in order to counter the myth that careers in science are difficult, uninspired, and socially isolated. Observing National STEM Day on November 8 is one approach. In nations such as Malaysia, the entire country celebrates this day, and a Convention Center in the capital city of Kuala Lumpur is set aside for STEM-related events for a full week. The event will be attended by teachers and students from primary and secondary schools around Malaysia. Numerous volunteers from different groups will support the occasion. Exhibitions, contests, interactive exercises, robotic challenges, drone challenges, and 3D printers are a few of the events held. This event features new technology on display to show schoolchildren how science and technology are used in the real world. This annual occasion encourages a lot of young female students to pursue careers in STEM.

The higher education system in Malaysia has demonstrated its ability to promote women in the STEM fields by mitigating the detrimental stereotype that STEM is "difficult and not for me." Traditionally, the Year 13 results have been the entry point for college STEM programs. However, secondary school students can choose to forego Years 12 and 13 by enrolling in a three-year STEM diploma program, such as a three-year engineering diploma, and then pursuing a three-year engineering bachelor's degree. Students are exposed to half of the material in practical lab activities during the Diploma program. Many female technicians hold degrees and are employed freely in the engineering sector. An increasing number of female engineers are becoming university graduates and rising to positions as chief executive officers (CEOs) in businesses.

The type of school (private vs. public) has an impact on a student's job choice and achievement in STEM education. The equal opportunities offered by private or independent schools attract parents and pupils. A few examples include smaller class sizes, more accessible resources, flexible curricula, and fewer teacher shortages. Private schools provide stronger learning support and instructional programs than public schools [4].

### *3.5. Collaboration (Blow out the Fact that STEM is a Collaborative, Social, and Community-Focused Field.)*

Post-industrial governments are making strides toward increasing female enrollment in STEM fields of study and employment as well as student retention in science classrooms. Policies that offer financial incentives for employment and entrepreneurship in STEM fields, financial incentives for the STEM sector, the inclusion of computer coding in the curriculum, more time for teaching STEM subjects, and specialized training for science teachers at the primary and secondary levels are some of the actions taken to encourage women's participation in STEM [29].



A major focus of the White House office's 2013 Five-Year Strategic Plan for STEM Education was the need for additional STEM-skilled professionals, as there is believed to be a shortage of at least one million of them [27]. The four key areas that have been identified are encouraging students to participate in STEM subjects during their basic education, increasing the number of students from underrepresented groups enrolled in STEM higher education courses, and expanding access to STEM programs. Although women are underrepresented, they hold 25% of STEM occupations, and they make 33% more money than people in other industries.

The Science Olympiad and other national competitions have shaped the interests and skills of 21st-century female students. The youngsters' decision to specialize in STEM disciplines in college was supported by the time they spent preparing for and participating in the competition. Furthermore, the Science Olympiad helped students acquire essential skills for the twenty-first century [27].

Studies show that most of the work in the United States (US) is concentrated in younger age groups. The UK lacks a set body of work, whereas the US tracks the effects of including engineering design as a standard in the Next Generation Science Standards for both teachers and students (ages 5-8) at the K-12 level [6]. Women in Engineering is a branch of the IEEE in the United States that actively encourages women to pursue careers in engineering. To explore ways of inspiring female students in primary and secondary schools to pursue careers in STEM fields, the Institution of Engineering and Technology (IET) in the United Kingdom ought to form a Woman Engineer team.

In contrast, The Institutions of Engineers Malaysia (IEM), a volunteer organization with over 20 technical sections, provides a range of activities for engineers in Malaysia. Only female engineers and female engineering students make up the Woman Engineers Technical Division. The goal of the yearly symposium lectures and regular get-togethers is to increase the number of female engineers and students in the network.

Encouraging women to pursue STEM education can also be accomplished by providing ample time in the classroom for STEM instruction. Secondary education in the UK is divided into two categories: public/state schools and private/independent institutions. There is a Grammar School for pupils with extraordinary achievement among public schools. Engineering, computer science, and design and technology are now available as extra courses in the General Certificate of Secondary Education (GCSE). The institution is required to make sure that the instructors have received adequate training in the module or have attended those courses as part of their undergraduate degrees. To make learning enjoyable for female students, educators possessing adequate knowledge and experience will present the material in creative and captivating methods.

Additionally, the school can assist in setting up summer programs for female students in Years 10 and 11. Visits to high-tech businesses and interactions with female scientists should be part of the curriculum. Modern Orthodox Jewish high school girls who attended this summer camp shared their thoughts on the girls' perceptions of female scientists and engineers, their ability to overcome challenges in STEM disciplines, and their potential career choices [27]. Therefore, more women will be able to enroll in STEM courses thanks to the partnership between secondary schools and businesses.

Role models (Give girls the chance to engage with and pick up knowledge from a variety of women. STEM role models)

Educators and activists continue to influence the media, corporations, and educational institutions to present and recruit women in all STEM occupations. Campaigns encourage employers to provide a friendly workplace for women in STEM disciplines. This also includes more female professors who are role models and teach STEM courses at universities. Teachers of physics in schools should feel the same way. At the A-level, there should be an equal number of male and female physics lecturers.

Female students' enrollment in STEM courses may be significantly influenced by the encouragement of their teachers. Women who enroll in STEM university courses are influenced by their parents' support as well as their role models [12]. The perceptions of support and barriers that students had for pursuing STEM subjects were greatly influenced by their teachers. When female students observe their female STEM teachers, they will feel more confident that they can succeed in

STEM fields as well. This could involve pursuing a profession in teaching or another STEM-related field.

A study was done to find out if young Swiss girls who intended to pursue careers in STEM fields enrolled in secondary education after two years. These young women claimed that their learning experiences, family support, and role models had a major impact on their decision to seek careers in STEM. These children have formed an identity as "scientists" since they were very young. Every time they study STEM courses or engage in STEM activities, the habitual thought that they are scientists that is already stored in their subconscious mind will be triggered. Furthermore, pupils always see themselves as role models of "scientists." These are the kids' chances of success in continuing their STEM careers and higher education.

#### 4. Conclusions

The country has long since made the transition to Industry 4.0, but the rise of STEM has always had an impact on a variety of businesses. Women's involvement is still seen as being lower than men. To sum up, a variety of factors contribute to the exclusion of women from STEM fields. There are three main causes of women's disengagement from STEM fields: behavioral, environmental, and personal aspects. To increase women's participation in STEM, six topics have been identified. Role models, growth attitudes, opportunities, stereotypes, and role links are some of them.

It is important to provide women with a range of knowledge about the nature of employment for them to choose careers that align with their values and sense of self. Their involvement in STEM subjects will increase as a result. Choosing a career that fits with their short- and long-term goals is another aspect of this.

#### Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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