Where Did All The Great Women Go?

The Matilda Effect and The Repercussions of Lost Women in History

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Abstract

Many of the women that have contributed to the scientific field have been lost to history either from their male colleagues taking credit for their work or people deeming their work not important. Women such as Rosalind Franklin, Lisa Meitner, Emilie du Châtelet and many more were lost to history, their contributions to science and technology overlooked. These women were affected by the phenomenon called The Matilda Effect. The Matilda Effect is a bias against acknowledging the achievements of those women scientists whose work is attributed to their male colleagues. This thesis will explore and visualize the connection between The Matilda Effect and women in science today by answering questions such as who the women effected by The Matilda Effect are, what the lasting effects on the world today are, and how female role models can increase the number of girls entering into STEM fields.

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Table of Contents

Abstract **2**
Acknowledgements **3**
Table of Contents **4**
Introduction **5**
Background **7**
History of The Matilda Effect 7
Women Affected 8
Women in Science Today 10
You Can't Be What You Don't See 11
Treatment **13**
Methods 13
Design Decisions 15
Conclusion **18**
References **19**

Introduction

Picture yourself back in grade school when you first learned about science. You probably learned of great scientists such as Albert Einstein, Isaac Newton, and Charles Darwin, but did you learn about Rosalind Franklin, Lisa Meitner, or Emilie du Châtelet? Who are these women and why aren't they household names? These women are all female scientists that were forgotten in history for some reason or another. Rosalind Franklin was an important contributor to the discovery of the double helix structure of DNA in 1953 but did not receive the Nobel Prize for her work, while her male colleagues did (Lee, 2013). Lisa Meitner's work in nuclear physics laid the groundwork for the atomic bomb when she discovered that nuclear fission could create large amounts of energy. Like Franklin, her work was not recognized, and her male colleague won the Nobel Prize while she did not (Lee, 2013). Emilie du Châtelet made important contributions to Isaac Newton's *Principia*. In her translations of Newton's work, she added a 180-page commentary where she reworked some of Newton's work in the language of calculus helping to articulate and popularize his theories (Arianrhod, 2015). Newton is taught in every classroom, while Emilie is not.

All of these women were lost to history, their contributions to science and technology overlooked in favor of their male colleagues. They were all victims of The Matilda Effect. The Matilda Effect is a bias against acknowledging the achievements of those women scientists whose work is attributed to their male colleagues. Margaret W. Rossiter coined the term in 1993, in her article "The MathewMatilda Effect in Science". Rossiter named the term after Matilda J. Gage, who was a women's suffragist and abolitionist in the 19th century. Gage criticized men's tendency to rob women of their scientific and technological inventions and advancements in her 1870 essay "Woman as Inventor" (De Montety, 2019). The women listed above are not the only females that have been victims of The Matilda Effect. There have been many women's contributions that have been lost to history.

Now, put yourself back in grade school learning about scientists for the first time. The boys in the room are thrilled and engaged to learn about men that have contributed to science. They can picture themselves doing the same thing, going on to study science and possibly discovering/creating something as brilliant as the people they learn about in class. The girls in class are also inspired, but they aren't hearing about anyone like them. They are questioning if they can be great scientists themselves. They are questioning if women become renowned scientists at all. Many of them will go on to pursue degrees in other disciplines, leading to less of them entering professional scientific fields, furthering the gender gap in STEM (Science, Technology, Engineering, and Math). How can they see themselves becoming successful scientists when they don't see any females like them that have succeeded in history?

A 2020 study conducted by Susana Gonzalez-Perez, Ruth Mateos de Cabo, and Milagros Sainz in Spain asked the question of whether having female role-models in STEM makes girls want to go into STEM themselves. The study was conducted with 304 girls from 12-16 years of age. This study showed that a top way to encourage girls to pursue science and technology studies is to expose them to actual successful female role models. The study also showed that stereotypes around a woman's role in science and technology were challenged after being exposed to female role models. Role models were shown to inspire young girls and create a sense of belonging in the STEM community (González-Pérez, Mateos de Cabo, Sáinz, 2020).

Imagine yourself in your grade school classroom once more. Imagine if the students were taught about Albert Einstein, Rosalind Franklin, Isaac Newton, Emilie du Châtelet, Charles Darwin, and Lisa Meitner; both boys and girls would have the ability to put themselves in these scientists' shoes and see a future for themselves in science. They could all see themselves going on to invent the next big technology or discover the newest chemical reaction.

This thesis will explore and visualize the connection between The Matilda Effect and women in science today. It will start by exploring The Matilda Effect and the women that fell victim to it. It will then go on to explore the effects of female scientists not getting credit for their work/being written out of history, such as the lack of females in STEM Bachelor programs, the lack of females in scientific fields today, and the lack of females receiving scientific rewards. Finally, it will go back to where it all begins for girls in science, grade school, looking at the lack of female scientist role models for girls and how increasing role models can encourage young girls to pursue STEM studies/careers. It will conclude with the importance of uncovering and learning about the lost women scientists in history and how doing so can increase the number of females in STEM today.

Background

History of The Matilda Effect

For centuries women in science have been overshadowed by their male colleagues. The gender gap in science seen today is not a new phenomenon and it did not stem from nothing. The oppression of women in science has been going on for years and has a rich history.

Matilda J. Gage

Matilda J. Gage was a women's rights activist, suffragist, and abolitionist. Gage was a cofounder, alongside Susan B. Anthony and Elizabeth Cady Stanton, of the National Woman Suffrage Association. She was a well-established speaker and writer and in 1870 wrote "Women as Inventor", an essay in which she talks about the world's tendency to overlook female inventions. She states in the essay, "No assertion in reference to woman is more common than that she possesses no inventive or mechanical genius, … although woman's scientific education has been grossly neglected, yet some of the most important inventions of the world are due to her." (Gage 1870). She then goes on to list inventions by women that were credited to men, most often husbands, such as the cotton-gin, invented by Catharine Littlefield Greene, and pottery underglaze, invented by Louise McLaughlin, as well as many others. She also mentions powerful women of the past in ancient Greece, ancient China, and the Incan Empire, and the fact that modern chemistry and medicine owes itself to the women of the past who partook in witchcraft and alchemy. With all of these examples she brings awareness to the many patents wrongfully given to men through stealing and the fact that no one would have acknowledged a patent by a woman even if she was able to get one. (Gage 1870).

Margaret W. Rossiter

Margaret W. Rossiter has devoted her life to studying the history of women in science. She quotes a time at a talk given at Yale University in 1969, where she did her studies at the time, where she asked a group of male professors if there were ever any female scientists and they answered with a definite no. She went on to break ground in the study of women in science, bringing many lost female contributions in history to light. (Dominus 2019). In 1993 she coined the term The Matilda Effect, named after Matilda J. Gage, which describes the bias towards male scientists due to the pattern of male scientists taking credit for their female colleagues' achievements.

The Matilda Effect

The Matilda Effect is defined by the Collins English Dictionary as "The systematic under-recognition of the contributions of women to science in favor of their male colleagues." Since the coining of the term in 1993, The Matilda Effect has been cited in many papers as scholars, inspired by Rossiter, fight to fix this problem (Dominus 2019). The Matilda Effect is the female version of "The Mathew Effect", described by two sociologists as the tendency to give known scientists credit over their unknown colleagues. It is named after the gospel Mathew, specifically drawing from his passage, "For to everyone who has will more be given, and he will have abundance; but from him who has not, even what he has will be taken away." The Matilda Effect and The Matthew Effect describe this phenomenon of a select few scientists receiving all the credit for scientific successes, even if most of the credited work wasn't theirs. (De Montety 2019). This phenomenon extends past science. This pattern of males stealing credit from their female colleagues can be seen in all disciplines.

Women Affected

There have been countless women affected by The Matilda Effect and certainly many women affected who haven't been discovered yet. For the sake of time allotted in this thesis, I will go over only a few of these women.

Rosalind Franklin

Rosalind Franklin was a chemist who made breakthroughs in the field of DNA. Franklin was crucial to the discovery of the double helix structure of DNA but didn't receive the credit she deserved and is little known for this contribution today.

Franklin was an extremely intelligent woman. She studied physics and chemistry at Newnham Women's College at Cambridge University and completed her Ph.D. thesis on the porosity of coal. She later perfected her skills in X-ray crystallography. She eventually landed at King's college where she studied DNA with her colleague, Maurice Wilkins. Franklin and Wilkins did not get along which led Wilkins to seek out other colleagues. These colleagues were Francis Crick and James Watson, who Wilkins showed Franklin's unpublished data to. Franklin's unpublished data allowed Crick and Watson to create their famous DNA model receiving full credit for this discovery while Franklin received none. Watson, Crick, and Wilkins later won the Nobel Prize for their discovery while Franklin did not (Lee 2013).

Lisa Meitner

Lisa Meitner was a physicist whose work in nuclear physics led to the discovery of nuclear fission which was an essential element in the creation of the atomic bomb. She, however, was left out of the paper published about this initial discovery and didn't receive the Nobel Prize, while her male colleague did.

Meitner received her Ph.D. in Physics from the University of Vienna and soon after moved to Berlin to collaborate with Otto Hahn, a chemist. After the Nazis took over Austria, Meitner, who was Jewish, made a move to Stockholm where she continued to collaborate with Hahn in secret. Meitner contributed the explanation for the nuclear fission experiments Hahn conducted, without which Hahn would have no means for publication of his findings. Hahn published his work without including Meitner as a co-author and later received the Nobel Prize for this discovery while Meitner received no credit (Lee 2013).

Emilie du Châtelet

Emilie du Chatelet was a French mathematician best known for her French translation of Isaac Newton's *Principia*. Emilie is little known as she has been overshadowed by the great men in her life, her lover, the great French writer, Voltaire, and her colleague, Isaac Newton.

Emilie was mostly self-taught, especially in the higher levels of math and physics, which she had to learn on her own. She was extremely intelligent and a feminist in her own right. Emilie and Voltaire were colleagues of Newton and after his death set out to write a translation of his work. Voltaire was capable of doing the writing but needed Emilie for all of the mathematical elements. While working on the mathematical translations of Newton's work, Emilie decided to go further and write a 180-page commentary to the translation. Emilie's commentary included her own reworkings of Newton's *Principia*'s key proofs in calculus. Newton was afraid to write his proofs in the new language of calculus because he thought people wouldn't read them, but Emilie brought these proofs to life. Emile helped to articulate and popularize Newton's theories, but her work was soon forgotten after her death, while Newton and Voltaire live on to be two of the most famous names in history (Arianrhod, 2015).

Overall

The stories listed above are only three instances of treatment countless women in science have received, their work continually underappreciated and undervalued. Many women worked as "volunteers" seeing their contributions attributed to others (Lee 2013). These female scientists not being recognized for their work has led to less female scientists talked about in daily life and written in textbooks and continues the cycle of female scientists being taboo. There have been

many efforts to reverse the effects of these women being written out of history, but women in science today still face the repercussions of the past.

Women in Science Today

Women are represented in the STEM fields at all levels at a significantly lower rate than men. Women earning STEM degrees, working in STEM fields, and receiving high level STEM awards lies behind men accomplishing the same by large numbers.

Higher Education

Data from The U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics shows that since 1970 women who have received STEM degrees has been increasing steadily, but they still only account for 36% of degrees earned in STEM overall. The most STEM degrees awarded to women was in the health professions and the least amount awarded to women was in the engineering disciplines. Computer science is the one outlier in that women receiving degrees in computer science peaked in the 80s and has been decreasing ever since. At one point, women made up most of the computing workforce, but were pushed out in the 80s. This may be due to the development of personal computers. Today, introductory coding courses can be playing a role in discouraging females into going into computer science. In this now male dominated field, women aren't as welcome as they once were (Staff Writers, 2021)

The Workforce

Data from the U.S. Census from 2019 show that there are large gaps in employment between males and females in all STEM disciplines except for social sciences. The largest gaps exist in computer and engineering occupations, which matches with the low percentages of women receiving degrees in these fields. There is another huge gap in the health professions, with about 2,631,691 female workers and 7,805,668 male workers. Although there are many females working in the health professions, there is still a huge gap compared to the number of males.

Higher Awards

The main high-level awards in the STEM fields are The Nobel Prize in Medicine, Chemistry, and Physics, the Turing Award received for high achievements in coding, and the Fields Medal received for high achievements in mathematics. Only 23 out of the 622 Nobel Prizes in Medicine, Chemistry, and Physics given since 1901 have been awarded to women. The first Nobel Prize awarded to a woman was in 1903 to Marie Curie. Since then, 3 women have won a solo prize and 19 have shared one (2020).

Only 3 out of the 70 Turing Awards given since 1966 have been awarded to a woman. The first Turing Award given to a woman was in 2006, 40 years after the first award was received.

(D'Agostino, 2020). Only 1 out of the 60 Fields Medals given since 1936 have been awarded to a woman. The first woman to win the Fields Medal is Maryan Mirzakhani, who won the award in 2014 for her work in the geometry of Riemann surfaces. A woman didn't receive this award for success in mathematics until 78 years after the award was first received (Castelvecchi, 2020).

You Can't Be What You Can't See

"You can't be what you can't see" is a quote by Marian Wright Edelman, Founder of the Children's Defense Fund which is a nonprofit that works for child advocacy (Jong, 2020). This quote draws on the idea that people can't become what they don't see possible. This ties in especially when looking at grade schoolgirls and their inclination to study science. Kids start learning about science from a young age and eventually start to learn about the people that made the scientific concepts they learn about possible. Most of the scientists they learn of, however, are men. As Edelman's quote states, how are young women supposed to envision themselves becoming scientists if they don't see other women being scientists? How are they supposed to be what they can't see?

Female scientists are taught about in science curriculums much less than male scientists. Sources from 5 children's education websites indicate that female scientists make up at most about 20% of the scientists taught about in schools. Thebestschools.org list of "The 50 Most Influential Scientists in the World Today" includes 5 female scientists and 45 male scientists (TBS Staff, 2021). This list, which was released in 2021, is especially interesting because it looks at contemporary women in science. Even today, when women are no longer having their contributions stolen from them, female scientists are still seen as less important to learn about in schools.

It is important for young women to have role models and other women to look up to in science. When asked to name scientists, people can probably come up with a few female names but not nearly as many as male names. Young men have plenty of scientists they can look up to. They learn about famous male scientists in school and see plenty of male scientists in the world around them as most scientific jobs are held by men. Women lack female scientist role models in school and in their daily life, which emphasizes the need for more female role models further.

Going back to the 2020 study on role models mentioned in the introduction, female role models were proven to benefit young women and encourage them to pursue STEM studies. Witnessing real experiences of actual women succeeding and excelling in STEM professions inspires schoolgirls to do the same (González-Pérez, Mateos de Cabo, Sáinz, 2020).

This presence of role models in STEM, in academic and personal settings, is something that young boys live with and take for granted every day. The absence of females in STEM also leads

to stereotypes around the idea of women entering into STEM fields. These stereotypes include men being more technical while women are more communicative and social and the idea that men are better in math overall. Introducing role models into the academic setting seen in the 2020 study helped to challenge these stereotypes. Girls saw that skills like communication and social skills are prevalent and needed in STEM disciplines. They also saw that women can be just as good at math than men. (González-Pérez, Mateos de Cabo, Sáinz, 2020).

Female scientist role models are important from the start of girls' academic careers to allow them to see figures just like them in STEM disciples. The importance and the need for more female role models should persuade the world to counteract the effects of The Matilda Effect and rediscover the lost women scientists of history. We have seen how The Matilda Effect has affected how women are perceived in science today and how they will continue to be perceived if action isn't taken to learn about the lost women whose achievements were written out of history.

Treatment

Methods

Data Sources

The data comes from multiple different sources. The main data draws from a 2020 case study conducted by a university in Spain on female role models, The Department of Education Statistics, and The U.S. Census. The sources and data queries are detailed below.

Source Title	Description/Citation	URL
2020 Case Study on Female Role Models in STEM	Data on differences in mean rating of the 5 variables measured in the study were pulled from the final study documentation	https://www.frontiersin.org/articles/10.3389/fpsyg.2020.02204/full
Data on Online Science Curriculums	Data on scientists taught about in the classroom parsed from 5 online education websites	https://thebestschools.org/features/50-influential-scientists-world-today/ https://www.dkfindout.com/us/science/famous-scientists/ https://www.educationworld.com/science/scientists.shtml https://teachwithfergy.com/famous-scientists-who-changed-the-world/ https://www.famousscientists.org/popular/
Percent of bachelor's Degrees Awarded to Women in the US from 1970 to 2011	Department of Education Statistics. Percent of bachelor's degrees pertaining to STEM were pulled from the dataset	https://www.kaggle.com/sureshsrinivas/bachelorsdegreewomenusa
STEM and STEM-Related Occupations by Sex and Median Earnings: ACS 2019	U.S. Census Data. Data on estimated number of men and women in each STEM occupation group was parsed from the dataset	https://www.census.gov/data/tables/time-series/demo/income-poverty/stem-occ-sex-med-earnings.html
Statistics on Turing Awards	Number of women who received Turing Awards and descriptions of	https://slate.com/technology/2020/01/turing-award-acm-

	them pulled from an article on the Turing Award	women-recipients.html#:~:text=Since%201966%2C%2070%20computer%20scientists,Only%20three%20have%20been%20women
Statistics on Fields Medals	Number of women who received Fields Medals and descriptions of them pulled from an article on the Fields Medal	https://apnews.com/article/nobel-prizes-chemistry-archive-3227341e3086af0cfee34a695416eeb9#:~:text=In%201983%2C%20Barbara%20McClintock%20won,chemistry%20and%20four%20in%20physics
Statistics on Nobel Prizes in Medicine, Chemistry, and Physics	Number of women who received the Nobel Prize in Medicine, Chemistry, and Physics pulled from an article on the Nobel Prize	https://apnews.com/article/nobel-prizes-chemistry-archive-3227341e3086af0cfee34a695416eeb9#:~:text=In%201983%2C%20Barbara%20McClintock%20won,chemistry%20and%20four%20in%20physics
Biographies of women affected by The Matilda Effect	Bios were pulled from multiple different sources	Hedy Lamarr, Vera Rubin, Chien-Shiung Wu, Ada Lovelace, Katherine Johnson (https://www.marieclaire.com/culture/g5026/female-discoveries-credited-to-men/?slide=1), Trotula of Salerno (https://thebestschools.org/magazine/brilliant-woman-greedy-men/), Maria Merian (https://www.biography.com/news/alice-ball-female-scientists)

The data was visualized to show the women lost to history, repercussions of this, impacts, and possible solutions. The visualization could have been expanded with additional women affected by The Matilda Effect, but the women used are the only ones that had photos available on

creative commons. It also could have been improved from expansive data on scientists taught about in various grade schools, but this data was not widely accessible.

The case study data was pulled from a study conducted at the Department of Business Economics, School of Business & Economics, Universidad CEU San Pablo in Madrid, Spain and the Internet Interdisciplinary Institute, Universitat Oberta de Catalunya (UOC) in Barcelona, Spain. Data on the difference in mean rating of the 5 variables measured in the study were pulled from the final study documentation. The 5 variables assessed are enjoyment in math, importance attached to math, gender stereotypes around math, expectations of math success, and likelihood of choosing a university degree across the following four STEM disciplines: math, physical science, computer science, and engineering. The study was conducted on 304 girls, who were given a survey to rate the variables above on a scale of 1 to 7 before and after being exposed to the female role models. All mean differences were significant with p values less than 0.05.

The data on online science curriculums was manually compiled from 5 children's education websites (thebestschools.org, Dorling Kindersley, educationworld.com, Teach with Fergy, famousscientists.org). Each website had a list of scientists to teach about in the classroom. The number of females/males per list was pulled and added manually to an excel sheet and saved as an csv file to create the final dataset.

The data on the number of women/men who were awarded the Turing Award, Fields Medal, and Nobel Prize in Medicine, Chemistry, and Physics were manually compiled from multiple different websites and used to create the SVG based visualizations.

The bios of the women were manually compiled from several different websites and added to an excel sheet. The excel sheet was changed to a json file which was used for the final grid visualization.

The actual visualization was created using vanilla JavaScript. D3.js was used to create most of the visuals and graph-scroll.js was used for the scrollytelling and graph transitions. The SVG based visualizations were created in Adobe Illustrator.

Design Decisions

My main design goals were to create a final product that is clean and easy to read and understand and to create a story that does the concept and the women featured in the project justice. The design went through a lot of different iterations and changes, but ultimately, I wanted the visualization as a whole to be a story.

The visualization uses graph-scroll.js for the scrollytelling form and transitions. It uses D3.js to create most of the individual visualizations. All of the award visualizations and the final visual of all of the women’s names were made using Adobe Illustrator. Baskerville is the primary font used for the project title and the final visual of the women’s names. Lucida-Grande is the secondary font used for all of the overlay text, all text breaks, and all visualization headers and

text. Purple and gray are the main colors used for all visualizations with purple indicating female and gray indicating male.

The visualization opens with a visual of five of the women affected by The Matilda Effect separated by question marks, meant to symbolize the many women affected that haven't been discovered yet. As the user scrolls the visualization goes to a text with background on The Matilda Effect. As the user scrolls again, the first data visualization comes into view and is stuck on the screen while explanatory text scrolls by.

The first visual is a grid of eight women affected by The Matilda Effect. The grid is interactive and allows for the user to click on a picture and see the biography of that woman. The pictures of the women are placed allowing black and white photos and colored photos to be spread out. The women were selected in hopes that all girls looking at the photos will be able to find a woman they can identify with. I would have hoped to incorporate more women of color in this visual, but I had to work with the data I had on women affected by The Matilda Effect, which did not include as many women of color as I would have liked to see. My hope is that more women of color affected will be discovered in the future.

The second visual slides into view as the user continues to scroll. This visual uses a simple stacked bar chart to show the differences between the number of female and male scientists included in online science curriculums. The percentage of males to females was added on top of each bar to make it easy for the user to understand the number differences at first glance.

The third visual displays the difference in the average mean rating of the 5 variables from the 2020 case study on female role models in STEM. The visualization centers lines for the 5 variables on the 0 line and the lines extent out to their value from there. Each variables line is highlighted as the text about that variable slides onto the screen. The number of the mean difference for each variable is printed next to each line to allow the user to see the exact value at an easy glance.

The fourth visual is a stream graph displaying the percent of women in 8 STEM degree disciplines (Physical sciences, math and statistics, health professions, engineering, computer science, biology, architecture, and agriculture). The computer science strip highlights as text about it scrolls onto the screen and each strip of the stream graph highlights as the user rolls their mouse over it.

The fifth visual is a Cleveland dot plot displaying the number of males and females employed in 7 different STEM disciplines. Different disciplines of the dot plot are highlighted as text highlighting those sections scroll into view.

The sixth, seventh, and eighth visuals were created in Adobe Illustrator and display the number of women/men that received different high level STEM awards. The sixth and seventh visuals are waffle charts using an illustration of the award being displayed. The eighth visual is a pie chart in the shape of the Nobel Prize (the award being displayed for that visual).

The visualization ends with a visual of the names of the victims of The Matilda Effect as a final “say their name” message.

Conclusion

This project aims to bring light to the phenomenon of The Matilda Effect, who the women effected by The Matilda Effect are, what the lasting effects on the world today are, and how female role models can increase the number of girls entering into STEM fields. It is clear from the research that women are represented in the STEM fields at all levels at a significantly lower rate than men. Women earning STEM degrees, working in STEM fields, and receiving high level STEM awards lies behind men accomplishing the same by large numbers.

How can we counteract this issue and get more women in STEM? As the case study shows, being introduced to females in STEM can lead girls to stronger perceptions of it and a better chance of wanting to go into it themselves. The idea of introducing young girls to in person role models can also be applied to learning about role models from the past. As it currently stands, most of the scientists taught about in schools are males. This doesn't allow girls many scientists to look up to or at least doesn't allow girls many scientists to look up to that look like them. Uncovering females in science that have been overlooked and written out of history can create more women to teach about in schools and to talk about in general, allowing girls and everyone to see more women in STEM.

The importance of uncovering the lost women in history lies in more than just bringing their stories to light. Young girls learning about these women's contributions to STEM can influence girls to go into STEM themselves. Learning about more women in science can help change the perceptions of it in everyone's eyes and put the world on a positive trajectory to increasing the number of women in science, technology, engineering, and math.

Organizations such as The New Historia and The Smithsonian American Women's History Initiative are working towards uncovering more women in history and spreading awareness around the issues of women's achievements being overlooked. Although many women's stories are finally getting the recognition they deserve, we still have a long way to go to uncover all of the lost stories.

This project looks at all women as a whole. It does not touch on the greater issues women of color face in receiving the recognition they deserve. A possible extension of this project would be to look at this issue deeper and dive into the many injustices women of color have faced in STEM and in the battle to getting recognized as they deserve.

References

Lee, J. (2013, May 19). 6 women scientists who were Snubbed due to sexism. Retrieved March 11, 2021, from https://www.nationalgeographic.com/culture/article/130519-women-scientists-overlooked-dna-history-science

Arianrhod, R. (2020, December 09). Emilie du Chatelet: The Woman Science Forgot. Retrieved March 11, 2021, from https://cosmosmagazine.com/mathematics/emilie-du-chatelet-woman-science-forgot/

De Montety, C. (2019, August 19). The Matilda Effect. Retrieved March 11, 2021, from https://www.philonomist.com/en/kezako/matilda-effect

González-Pérez, S., Mateos de Cabo, R., & Sáinz, M. (2020, August 05). Girls in stem: Is it a female role-model thing? Retrieved March 11, 2021, from https://www.frontiersin.org/articles/10.3389/fpsyg.2020.02204/full#h7

Matilda Joslyn Gage. (2021, March 14). Retrieved March 19, 2021, from https://www.britannica.com/biography/Matilda-Joslyn-Gage

Gage, Matilda J. "Woman as Inventor" *The North American Review,* May 1883, Vol. 136, No. 318 (May 1883), pp. 478- 489

Dominus, S. (2019, October). Women scientists were written out of History. It's Margaret Rossiter's Lifelong mission to fix that. Retrieved March 19, 2021, from https://www.smithsonianmag.com/science-nature/unheralded-women-scientists-finally-getting-their-due-180973082/

Jong, A. (2020, June 19). You can't be what you can't see: How to get more women in tech. Retrieved March 23, 2021, from https://www.themuse.com/advice/you-cant-be-what-you-cant-see-how-to-get-more-women-in-tech#:~:text=One%20of%20the%20most%20striking,you%20can't%20see.%E2%80%9D

N. (n.d.). Rosalind Franklin: A Crucial Contribution. Retrieved March 25, 2021, from https://www.nature.com/scitable/topicpage/rosalind-franklin-a-crucial-contribution-6538012/

The 50 Most Influential Scientists in the World Today. (2021, March 30). Retrieved May 12, 2021, from https://thebestschools.org/features/50-influential-scientists-world-today/

Rackoff, C. (2019). Shafi Goldwasser. Retrieved May 12, 2021, from https://amturing.acm.org/award_winners/goldwasser_8627889.cfm

Steele, G. (2019). Frances ("fran") Elizabeth Allen. Retrieved May 12, 2021, from https://amturing.acm.org/award_winners/allen_1012327.cfm

Van Vleck, T. (2019). Barbara Liskov. Retrieved May 12, 2021, from https://amturing.acm.org/award_winners/liskov_1108679.cfm

Staff Writers. (2021, May 05). Women in computer science. Retrieved May 12, 2021, from https://www.computerscience.org/resources/women-in-computer-science/

A Nobel science first: More than one Woman winner, no man. (2020, October 07). Retrieved May 12, 2021, from https://apnews.com/article/nobel-prizes-chemistry-archive-3227341e3086af0cfee34a695416eeb9#:~:text=In%201983%2C%20Barbara%20McClintock%20won,chemistry%20and%20four%20in%20physics.

D'Agostino, S. (2020, January 06). Why have so few women won the most important award in computing? Retrieved May 12, 2021, from https://slate.com/technology/2020/01/turing-award-acm-women-recipients.html#:~:text=Since%201966%2C%2070%20computer%20scientists,Only%20three%20have%20been%20women.

Castelvecchi, D. (2020, June 08). Stirring biopic of the first woman to win TOP Maths prize. Retrieved May 12, 2021, from https://www.nature.com/articles/d41586-020-01681-2#:~:text=Maryam%20Mirzakhani%20broke%20into%20the,Fields%20Medal%2C%20established%20in%201936.

NobelPrize.org. (n.d.). Nobel prize awarded women. Retrieved May 12, 2021, from https://www.nobelprize.org/prizes/lists/nobel-prize-awarded-women/