

# ‘It Is Time to Operate Like a Woman’: A Corpus Based Study of Representation of Women in STEM Fields in Social Media

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## Abstract

This study explores the discourse of women in science, technology, engineering and mathematics or medicine (STEM) fields produced by Twitter users on social media, with a particular focus on language usage and function in this discourse. The exploration of the women in STEM discourse was achieved by collecting a body of tweets using popular hashtags addressing women in STEM from the last week of October 2017. Following a corpus-based approach, this study analyzes the most frequent evaluative adjectives and 4-grams. Results from the analysis of evaluative adjectives show that Twitter users represent women in STEM fields positively by using positive adjectives such as *great*, *amazing*, *inspirational* etc. Furthermore, the analysis of the most frequent 4-grams reveals that Twitter users employ hashtags such as #ilooklikeasurgeon and #womeninSTEM to promote the work of women in STEM fields, show their appreciation of women working and studying in STEM and challenge prevalent gender stereotypes of STEM professions. It was found that the production of women in STEM discourse by most Twitter users has contributed to increasing the strength of women in the STEM community in social media, evidenced by their practices of advocacy, networking and challenging gender biases online. The discourse of women in STEM in social media is an example of discursive activism that focuses on the larger dialogue of women in STEM and highlights dominant forms of sexism and gendered stereotypes of women’s work in male dominated professions.

**Keywords:** corpus-based, discourse analysis, discursive activism, gender stereotypes, language and gender, social media, women in STEM

## 1. Introduction

### 1.1 Introduce the Problem

Hashtag activism and digital feminism have emerged recently on social media platforms to raise awareness, build allegiances, resist stereotypes and offer solidarity for women (See for reference Konnelly [2015] and Everett [2018]). Twitter provides a supportive platform for women working in STEM fields via participation in specific hashtags. Such active participation in STEM hashtags forms a diversity campaign to encourage more girls to be involved in STEM contests or to be enrolled in STEM courses. The status, opportunities and challenges for women in STEM is worthy of being studied from a discourse analysis perspective in order to find out more about the nuances of women’s experiences of working in STEM fields (Note 1).

In line with previous arguments, this study contributes to the recent body of research investigating the ways social media is used to support women’s scholarships and professional practice in STEM fields. The focus of this study is to investigate the language surrounding women in STEM on Twitter by closely analyzing how Twitter users discursively construct the status, challenges and opportunities for women studying or working in STEM fields. The current study contributes to this literature. In the following sections, I start by providing background information on social media and women’s activism. I follow that with giving a description of theoretical perspectives adopted in this study and discuss the data and method of analysis that has been utilized. Finally, the results will be presented and discussed.

### 1.2 Social Media and Women’s Activism Discourse

Research supports that women’s activism in Twitter constitutes a new form of resistance that assists in increasing awareness of advocacy efforts (Konnelly, 2015). In analyzing affiliations, language used and contexts from

hashtags such as #YesAllWomen and #HeForShe, Konnelly investigated what provokes the use of certain hashtag in a given activist context and how the use of certain hashtags links to wider discourses and ideologies. To provide a context for the two hashtags examined, #YesAllWomen has the goal of discussing the shooting at the Isla Vista as an occurrence of systemic violence against women. By extending the discussion to the wider social issue of domestic violence, hashtags assist in delineating rhetoric that stresses that the domestic violence incident only speaks for an isolated action of one individual. In addition, #HeForShe is an activist campaign of solidarity for gender equality launched by the United Nations (Konnelly, 2015). In her analysis of the two hashtags, Konnelly concluded that “attitude type, attitude polarity, explicitness, and engagement are all encoded in tweets containing both #YesAllWomen and #HeForShe” (2015). Her conclusion might be extended to researching women’s activism in Twitter, especially the use of hashtags in the activist context and how this usage connects to broader discourses and ideologies that transcend the geographical borders of their occurrences.

Clark (2016) examined domestic violence in general which developed from discussing the specific event of a 2014 NFL domestic violence controversy in the US. The hashtags #WhyIStayed and #WhyILeft are about narrating the relationships during and after the domestic abuse. In the first part of the data, Clark (2016) analyzed 127/765 tweets where both hashtags told the story of the survivors and how their voices and personal stories assisted in shifting the blame from the abused into blaming the abusers. Blaming the abused in the relationship is a strategy that is hegemonic in media discourse coverage of domestic violence. In the second part of the data, 416 tweets used both hashtags to support people who fell victim to domestic violence. Clark stated that the Twitter platform offers active participation not only by noticing the hashtags but also by expressing a sense of solidarity and support to the people who were subjected to violence (2016). Similarly, Rentschler (2015) investigated the advice offered to women to prevent them from being objected to rape by analyzing tweets of the hashtag #safetytipsforladies. Twitter users express their “fed-upness” (Rentschler, 2014) of advice being offered to women to prevent rape. Twitter users challenged blaming rape victims by using humor to expose and resist hegemonic discourses of rape culture.

Bowles Eagle (2015) investigated how violence against women was protested in India, especially street harassment, by using hashtags such as #BoardtheBus and #StopStreetHarassment. Women used both hashtags to shift the conversation towards women’s right to reclaim public spaces. In addition, Twitter is considered a safe space for women who have experienced street harassment in India; they share their experiences and confront trolls who use sexist words and tropes in Twitter. In addition, in South Korea, Kim (2017) showed how the hashtag #iamafeminst was used to resist anti-feminist rhetoric. Twitter users placed their efforts in promoting the hashtag in the hope of countering misogyny in contemporary South Korea.

### 1.3 Women in STEM

The underrepresentation of women in STEM careers is frequently dubbed as a “leaky pipeline” (Blickenstaff, 2005), the popular metaphor describes the gender imbalance that is believed to be affected by a combination of factors. The results of these factors are that women end up not pursuing careers in STEM fields. The metaphor depicts women as leaks that leave the bounded space. Such a powerful depiction of women’s unwillingness to seek a profession in STEM fields has been challenged in the literature due to women winning research grants (Else, 2018). Yet, the issue still perseveres in the US, between 2008–2010, the gap of women holding doctorate degrees in STEM fields and taking up assistant professor positions widened by 22 percentage points (53.2% of female doctorates compared to 31.6% of female assistant professorships) (Ginther & Kahn, 2009).

The lack of diversity of women in STEM fields persists due to institutional factors (Cantu, 2012; Griffith, 2010; Linley & George-Jackson, 2013; Mayberry & Rose, 1999) and cultural factors (Monroe et al., 2008). Institutional factors and cultural factors filter out women from reaching professions in STEM, and these factors are: a) biological differences between men and women; b) girls’ lack of academic preparation for a science major/career; c) girls’ poor attitudes toward science and lack of positive experiences with science in childhood; d) the absence of female scientists/engineers as role models; e) science curricula are irrelevant to many girls; f) the pedagogy of science classes favors male students; g) a “chilly climate” exists for girls/women in science classes; and h) cultural pressures on girls/women to conform to traditional gender roles, i.e., an inherent masculine worldview in scientific epistemology (Blickenstaff, 2005).

All of the factors mentioned in the literature that contributed to the loss of diversity of women in STEM have triggered additional research and motivated scientists to try to alleviate the scale of the issue. Part of the solution is activism work through launching diversity campaigns or sponsoring girls and women to attend courses and conferences. Proposed holistic solutions in the literature to alleviate the underrepresentation of women include: a) increasing the appointment of women in powerful positions; b) redefining success in academia from linear success

into a system that rewards the accomplishment of men and women, for example adapting the leitmotif model for success in academia; c) rewarding services in academia would help into minimizing stereotyping service as women's work; and d) offering spousal hiring and day-care (Monroe et al., 2008).

#### 1.4 Research Questions

What are the most frequent evaluative adjectives in the whole corpus that collocates with *women*?

What are the most frequent 4-word clusters in the whole corpus?

What function(s) do evaluative adjectives and 4-grams serve for Twitter users?

## 2. Literature Review

### 2.1 Evaluative Adjectives

One of the most valuable resource of evaluation in discourse is the work of Hunston and Thompson's, in which they define evaluation as "[...] the broad cover term for the expression of the speaker or writer's attitude or stance towards, viewpoint on, or feelings about the entities or propositions that he or she is talking about" (Hunston & Thompson, 2000, p. 104). Evaluation is articulated by a speaker or a writer concerning a topic, and it can be categorized by polarity, whether positive, negative or neutral (Farah et al., 2016). Evaluative adjectives count on the pragmatic effects of their connotations more than they rely on sense or denotation (Allan, 2007). Backhouse (2003) stated that adjectives have an expressive component in which they refer to favorable and unfavorable connotations. He remarked that the expressive components articulate the attitudes of the speakers towards what they describe. In Bertand Russel's joke, *I am firm. You are obstinate, He is pig-headed!* The three adjectives share the common meaning of the description (strongly adhering to opinions), yet, the three adjectives have different value-judgements, a favorable with *firm* and unfavorable with *obstinate* and *pig-headed* (Backhouse, 2003). In the pragmatic dimension, Kerbrat-Orecchioni (1980) identified two categories of adjectives according to their evaluative role, namely, "objective" and "subjective".

In studies that employed discourse analysis approaches, the analysis of evaluative adjectives provided insights that revealed variations of use between different genres (see Tutin, 2010). Moreover, relating to the focus of this study, evaluative adjectives reveal the style and particular discourse function (see Duguid [2010] for the analysis of evaluative adjectives in the British newspapers discourse). Edo Marzá (2011) analyzed the use of adjectives on hotel websites and demonstrated that appraisal adjectives such as *special*, *perfect* and *flexible* constitute the largest category of evaluative adjectives. Thorpe et al. (2017) investigated the use of adjectives in UK Universities; these environment reports were submitted for Research Excellence Framework in 2014 (REF2014). The analysis was conducted using DICTION, a software that imbeds dictionaries to measure the tone in texts. The findings showed that both top ranked and low ranked UK Universities used more adjectives than expected, albeit with different purposes. The purpose for the use of high adjectives in top ranked Universities was to boost their reputations, while the high use of adjectives in low ranked Universities was found to recompense for weaknesses.

### 2.2 N-Grams

Clusters, lexical bundles or multi-word units or n-grams are terms used by computational linguists, discourse analysts and corpus linguists to refer to a sequence of adjacent lexical items. The most common definition of n-grams is that "[They] are identified empirically, as the combinations of words that in fact recur most commonly in a given register" (Biber et al., 1999, p. 992). N-grams are a powerful analysis tool for discourse analysis studies due to the surrounding context it provides (see for example McIntyre [2012] or Elgesem, Steskal & Diakopoulos [2015]). Moreover, appropriate use of n-grams has its benefits in discourse analysis studies in that n-grams assist in classifying texts semantically because they provide clues (Silva, 2006). In genre and register analyses, n-grams are investigated in analyzing different academic genres and registers. For example, Biber et al. (2004) studied the different uses of n-grams between university classroom teaching and academic textbooks. They found out that lexical bundles are more common in classroom teaching than in academic textbooks and that lexical bundles that express stances and references are more common in classroom teaching due to its spoken format. In addition, n-grams are used to investigate different discourses.

Many corpus-based researches have studied the use and the functions of 4-grams in written discourse (Byrd & Coxhead, 2010; Breeze, 2013... among others). Byrd and Coxhead (2010) analyzed the similarities between four academic disciplines in the use of 4-grams; the result showed that there are 73 4-grams that are shared in law, science, arts and commerce. Bal (2010) analyzed the use of 4-grams in the academic discourse of Turkish scholars who write in English. Bal compared the structure and the functions found in the Turkish academic discourse with those found in Biber et al. (1999, 2004). He found out that the Turkish academic discourse shares similar 4-grams categorized by Biber et al. (1999, 2005), except a few 4-grams that have the function of referring to previous

research such as *in accordance with the*. Breeze (2013) investigated the difference and the function in the use of 4- to 8-grams in four different legal genres; academic law, case law, legislation and documents. He categorized the n-grams into their grammatical class and their function in discourse and revealed their distribution across the four legal genres. He found out that academic legal genre employs the least n-grams in the data. Moreover, case law genre uses noun phrases that are related to agents, documents and actions and prepositional phrases that are related to framing function. Furthermore, legislation and documents exhibit more noun phrases and verb phrases that have a referential function.

### 3. Method

#### 3.1 Data Collection

The data collection in this study consists of constructing a corpus about women in STEM from Twitter. The construction process started with retrieving tweets. To ensure that the retrieved tweets were relevant to the topic of investigation, prominent hashtags were identified. Relevant tweets were then retrieved using Twitter Archiver (Agarwal, 2015). The hashtags were: #womeninTech, #GirlsWhoCode, #womenTechTalk, #womeninSTEM, #womenInSTEM, #womeninscience, #momscancode and #ILookLikeASurgeon. After collecting the relevant data, the next stage was processing and cleaning the data that consisted of removing tweets that contained non-English texts. 14,611 tweets were collected from 31/10/2017 to 01/11/2017. The corpus size was 267,927 words. In Table 1, Number of tweets per hashtag is presented. Both #womenintech and #womeninstem hashtags comprised the majority of the tweets (74% of the corpus size). Although other hashtags such as #ilooklikesurgeon and #techmums are less frequent in the corpus, they do represent specific discursive/discourses on certain professions. The top five locations of tweeps came from Portland, United States, London, global and Los Angeles, see Figure 1 below. As it can be seen, Figure 1 lists the US as contributing the most (with cities such as Portland and Los Angeles ranking the highest) to hashtags pertaining to the topic (Note 2).

Table 2 illustrate the number of tweets for each day in the data collection period. The selection criteria of the corpus focused on the time period that best represents women with the experience of studying or working in STEM fields in social media. Choosing the time period, that captures a representative corpus that covered all the fields related to STEM, is determined by many relevant events that occurred between 25th of October till the 31st of October 2017. The data collected for 7 days and allowed the researcher to draw on the wealth of experiences of women in STEM. These events are widely retweeted and have an impact on other Twitter users to participate in STEM hashtags and to be active in tweeting about women in STEM. The series of events were: the clinical congress conference which was held on the 25th and 26th of October respectively where many doctors and surgeons were presenting and networking in the conference, International Internet Day that was celebrated on the 29th of October where the status of women in technology was discussed, Nobel laureates which were chosen and the event triggered mentions of female scientists in many fields and Black History Month where many black women scientists were celebrated.

Table 1. Number of tweets for each hashtag in the corpus

Hashtag	Number of Tweets
#womenintech	6793
#womeninstem	4035
#ilooklikesurgeon	1213
#womeninscience	1197
#girlswocode & #womenwhocode	541
#womensurgeons	202
#girlsinstem	196
#techmums	179
#womeninleadership	137
#womeninengineering	118

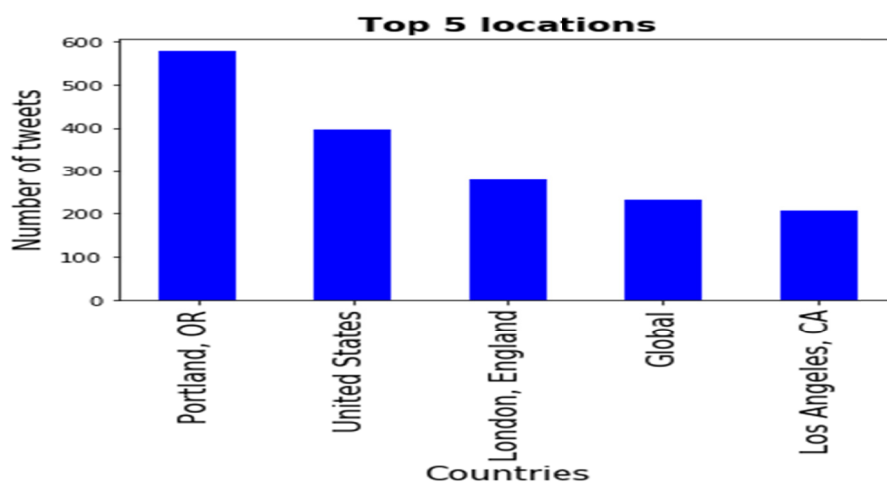


Figure 1. Top five locations that used hashtags pertaining to women in STEM

Table 2. Number of tweets for each day in the corpus

Dates	Number of Tweets
25/10/2017	1570
26/10/2017	2386
27/10/2017	2356
28/10/2017	2365
29/10/2017	2100
30/10/2017	2739
31/10/2017	1095

### 3.2 Data Analysis

The approach adopted for this study was a bottom-up corpus-based analysis using Sketch Engine (Kilgariff et al., 2004). The word *women* has been identified as a collocate worth investigating as a) it constitutes part of the phrase that denotes a membership to a specific professional group and b) through a linguistic analysis of its collocation, *women* can reveal specific attitudinal meaning about the status of women working in STEM fields. The analysis of evaluative adjectives has the objective of unraveling the underlying value systems and the discursive construction of women in STEM in social media. Therefore, the most frequent adjectives were retrieved using Sketch Engine (Kilgariff et al., 2004). A further categorization of evaluative adjectives was made following Kerbrat-Orecchioni's (1986) categorization. The first type of evaluative adjectives is axiological which "imply a qualitative evaluation, adding either a positive or a negative judgement to the modified noun and axiological adjectives reflect the speaker's/writer's cultural or ideological competence" (cited in Soler, 2002, p. 155). Furthermore, only 4-grams with a minimum frequency of 40 occurrences were included in the analysis by using Sketch Engine (Kilgariff et al., 2004). All 4-grams were retweets; therefore, some lexical bundles are repeated. For example, *you recommend anyone for*, *recommend anyone for* and *can you recommend anyone* are considered one lexical bundle in the analysis. N-grams are categorized into themes or topics, such categorization is meant to point at local textual functions in the discourse (see Mahlberg, 2007).

### 4. Results

Table 3 shows the total number of evaluative adjectives in the corpus that collocate with the word *women*. Twitter users in the women in STEM corpus frequently and positively evaluate women affiliated with STEM, namely their personality (*amazing*, *awesome*, *wonderful*), their initiative quality and ability to work independently (*brilliant*, *inspirational*, *inspiring*) and their ability being described as *great*, *good* and *incredible*.

Table 3. Evaluative adjectives that collocate with *women* in the corpus

Evaluative Adjectives	Frequency
1. great	579
2. amazing	468
3. good	274
4. first	181
5. awesome	169
6. inspirational	139
7. inspiring	128
8. incredible	78
9. brilliant	62
10. wonderful	85

The analysis of 4-grams suggests that there are categories: 1) promoting the work of self and other women in STEM, 2) women in STEM as a source of inspiration and 3) expressing and combating gender bias.

*Promoting the work of self and other women in STEM* is a category that relates to organizations or people who promote the work of women using the hashtag #womenintech. Promotion is about being able to support women in technology with the needed resources, information, initiatives and publicity. Moreover, promotion provides means for the technology industry to be more diverse. Examples 1 and 2 are concerned with non-profit organizations that provide support, training and networking to women who work in the tech industry. In examples 3 and 4, the hashtag #womenintech is used to provide information of job openings for women in technology, while example 5's hashtag is used for networking. In example 6, training for women is proposed in the form of an initiative by Dr. Sue Black which aims to get 1 million mothers to code (Note 3). In examples 7 and 8, younger women are encouraged to participate in student-led projects and hackathon competitions to empower them to participate in STEM fields, as it is found to be effective to create opportunities for women. Example 9 is a self-promotion tweet from one of the women's CEOs of a tech company.

Ex.1 *Cloud Girls Making a Difference For #womenintech #GirlsWhoCode* <https://t.co/luLJt6m44Q>

Ex.2 *There are organizations pushing for #womeninSTEM*

Ex.3 *Can you recommend anyone for this job? Software Developer Support #WomenInTech*

Ex.4 *This #job might be a great fit for you: Call Quality Analyst -* <https://t.co/GquBJK0n4E> *#Womenintech #STEM #CompTIA*

Ex.5 *Know a badass woman iOS or Android Engineer? </s><s> I'd love to chat! #iOS #android #womenintech* <https://t.co/G46X76J0H9>

Ex.6 *@Dr\_Black: We are going to get 1 million mums coding!! #techmums #womenintech Techmums...* <https://t.co/4y3zduaXhS>

Ex.7 *Calling all year10-13students!! Fancy a trip to NASA??#womenintech* <https://t.co/poFW5Zpr1W>

Ex.8 *This week's #WomeninSTEM focuses on the importance of empowering young women to pursue careers in STEM! Check it out! https://t.co/i6BIDaTAaR. @AccessNowApp receives \$10,000 from #MoveTheDial pitch competition https://t.co/CIepT3xab8 #CDNdiversity. The most effective way to do it, is to just do it.*

Ex.9 *Looking for a high energy keynote? I love sharing on the #Future! #womenintech #IoT #Cloud*

*Source of inspiration* is a category that expresses emotions of pride and honor to women who are working in STEM fields. Examples 1 and 2 are about showing pride and gratitude to women surgeons; tweets in #ILookLikeASurgeon contains selfies of women in the operating theatre or in group photos at conferences that work to act as a source of inspiration to others by increasing their visibility as both women and surgeons (Note 4). Examples 3 and 4 are prizes and awards that are presented to women who are innovators in science or are exceptional in engineering for the purpose of acknowledging their pioneer roles in STEM and most importantly motivate other women in the field. Example 5 emphasizes that women in technology should be empowered to work in technology in order to fight a male-dominated tech industry. In examples 6 and 7, an emphasis has been put on the domino effect on the collective good for all women if one woman succeeded in STEM. In addition, these latter examples show how the collective efforts of women can be geared towards the encouragement and support for women in science.

Ex.1 *The amazing surgeons I know!! #ASCCC2017 #ILookLikeASurgeon*

Ex.2 **Honored and privileged to have @pferrada1 as my fellowship mentor. #ILookLikeASurgeon**

Ex.3 Europe needs more #womenintech. We're **looking for inspirational stories to motivate others**  
<http://bit.ly/1HuNZ9G> #WiprizeEU #innovation

Ex.4 **Our Young Women Engineer of the Year Award** ceremony is the event of the year for #WomenInSTEM!  
 #IETywe

Ex.5 *4 reasons to be optimistic about women in technology* <https://t.co/R48jRYqJBN> via @BostonGlobe  
 #womenintech RT @madetech: #womenintech

Ex.6 **When one woman shines**, we all shine. Support each other. #womenintech

Ex.7 How **can we stand up** for #womeninscience? AcademiaNet Club founder Prof. Marlies Knipper has some insightful advice <https://t.co/82FXg8AQGy>

*Expressing and combating gender bias* is a category that is concerned with describing bias in the STEM fields such as underrepresentation, wage and promotional differences and combating gender stereotypes. Example 1 depicts the shift from computer girls into tech boys. Historically, working with computers involved plugging in cables in order for calculations to be made in 1930s; women used to work with computers as it was considered similar to clerical work that has been stereotypically associated with women. After attitudes toward working with computers changed, more men started to see the field as being more desirable. Example 2 is a comment on a picture of three girls dressing up as scientist in a science competition, the meaning of the expression **not enough candy in the world** is discursive and the writer's creative wordplay might: a) state that there is not enough candy in the world to give to girls in the picture or b) imply that women are still underrepresented in STEM fields, therefore there is not enough candy in the world to fill the void of underrepresentation, and the picture of three girls is a reminder of that fact. Examples 3 and 4 discuss the discrimination against women's promotion in STEM and the underrepresentation of women. Example 5 describes the fight against the stereotype of surgery being a specialty that is traditionally male-dominated.

Ex.1 Before there **was a Silicon Valley Jobs, Zuckerberg, and other tech boys, there were computer girls.**  
 #WomenInSTEM <https://t.co/ueZAcPvg7u>

Ex.2 **Not enough candy in the world...** #WomenInSTEM <https://t.co/W3Y2vMrt5a>

Ex.3 Cybersecurity is **still heavily a male domain**. Any **idea how to change** this?

Ex.4 Bias, not behavior, explains **differences in promotion rates between women & men**.

Ex. 5 It's time to **operate like a woman** #heforshe #ilooklikeasurgeon <https://t.co/gb0aE2WJP0>

#### 4. Discussion

Overall, in the analysis of women in STEM corpus, methods from corpus linguistics were implemented to highlight frequent adjectives and 4-grams that provide insights for studying attitudinal meaning and textual functions in discourse. Furthermore, the employment of a qualitative analysis allowed the researcher to examine linguistic evidences closely after identifying them in the quantitative part of the analysis.

The results in Table 2 and 3 suggest that Twitter users in the women in STEM corpus used language, coupled with the practice of hashtagging and retweeting, to convey a positive attitude for women working in STEM professions. Positive descriptors of women and their achievements through adjectives such as *amazing* or *great* or *inspirational*, and categories such as *women in STEM as a source of inspiration* and *promoting the work of self and other women in STEM*, appeal to Lauren Berlant's concept of "intimate publics" (Berlant, 2012). The shared worldview and emotional knowledge between Twitter users in women in STEM corpus emerged from the Twitter platform and its users in the STEM corpus expressed views in the hashtags that provide a voice for women in STEM who are underrepresented in STEM fields. Furthermore, their tweets provide lines of support, online campaigning, professional contests and networking opportunities for women working in STEM fields. Such positive depictions of women in STEM professions might be influenced by discourses of gender diversity and inclusion that includes STEM policies and programs that have the goals of diversity and increased representativeness for women in STEM fields (Metcalf, 2010).

Moreover, the 4-gram analysis shows Twitter users in women in STEM corpus addressing stereotypes and gender bias against women working in STEM fields by acknowledging its existence and attempting to change it. The use of language to express gender bias is in line with findings that define the nature of STEM work and education to be "gendered" (Parson, 2016). The gendered nature of STEM might hinder women from participation in STEM. To further discuss the "operate like a woman" example, Ruth Bleier, who is a pioneer in science and gender research,

has shown through her work how gender bias and inequality have affected professional and academic sciences such as biology. She has remarked that women's abilities have been questioned to do science, and women are pressured to "think like men" in order to thrive in scientific fields (Bleier, 1988). Similarly, such views about women's lack of ability to perform up to standard is shared in other fields; in recent research, women surgeons were perceived to be less competent than their male counterparts (Ashton-James et al., 2019). Gender plays a role in evaluating female surgeons (Fassiotto, Maldonado, & Kothary, 2018). It is for the purpose of combating gender stereotypes about women in STEM, Twitter users retweet of the sentence *it is time to operate like a woman* is to challenge the "think-like-a-man" stereotype by emphasizing that women surgeons seek to shift stereotypes about their professions. This is especially true when Twitter users are aware that sexism has been pervasive in STEM fields throughout history (Bleier, 1988). The choice of Twitter to fight gender stereotypes of women surgeons is not random, social media viewed by women surgeons as a way "to form networks that can negate some of the biases that [women surgeons] face" (Stamp et al., 2019).

Twitter users engaged with discursive activism (Clark, 2016). Discursive activism entails hashtags related to women's scholarships and professional practice require a further discussion with social or dominant ideologies in society. Women who have participated in the hashtag #iLooklikeasurgeon employ the hashtag as a form of discursive activism to highlight dominant forms of sexism and gendered stereotypes that do not think of them as successful surgeons. The results are in line with an experiment that examined whether feminine appearance of women is likely to be perceived to be a woman working in STEM fields. Results of the study show that feminine appearances are affected by stereotypical judgment that women with feminine attire are less likely to be perceived as working in STEM fields (Banchefsky et al., 2016).

## 5. Conclusion

This study investigated language used involving women in STEM discourse in social media during 2017 using a corpus-based approach. A corpus of tweets about women in STEM, from 25th of October 2017 to 31st of October 2017, were analyzed using Sketch Engine. Linguistic analyses, which involved a) word frequency information about evaluative adjectives and 4-grams and b) qualitative analysis, showed that most of the evaluative adjectives were used positively to describe women working in STEM fields. Three major categories of the most frequent 4-grams regarding women in STEM corpus were identified. The tweets of 4-grams were used to: a) promote the work of self and other women in STEM by using specific hashtags to provide opportunities of support, network and publicity; b) take pride in their work, women in STEM are a source of inspiration to other women; and c) express and combat gender bias and stereotypes about their work in STEM fields. Twitter users represent the online community of women in STEM to be supportive, linked and aware of gendered stereotypes of women working in STEM.

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## Notes

Note 1. The researcher is aware of the many acronyms that have discussed the status of women in scientific fields such as STEAM (science, technology, engineering, agriculture and mathematics) or STEMM (science, technology, engineering, mathematics and medicine). The use of STEM in this paper is inclusive and includes all scientific fields. The use of STEM is meant to rely on the most popular reference.

Note 2. Tweeps refer to Twitter users and tweets refer to short messages published in Twitter.

Note 3. <https://www.ft.com/content/7c7e0fc2-87f4-11e7-afd2-74b8ecd34d3b>

Note 4. [https://twitter.com/Aditi\\_Kapil/status/922973364070711297/photo/1](https://twitter.com/Aditi_Kapil/status/922973364070711297/photo/1)

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