

More Than an Engineer: Intersectional Self-Expressions in a Hashtag Activism Campaign for Engineering Diversity

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ABSTRACT

The feminist theory of intersectionality asserts that experiences of social categories, such as gender, vary based on context and demographic factors and can be best understood by capturing and analyzing participants' self-expressions. Social media provide a novel setting to study this phenomenon. We examined participants' self-expressions on a campaign for increasing engineering diversity (#ILookLikeanEngineer) and found that, consistent with an intersectionality perspective, in addition to their identity as an engineer, participants opted to: a) expand upon and provide specifics about their engineering identity; b) expressed their affiliation with an institution or company; c) expressed personal aspects of their identity such as family or hobbies; d) expressed support for someone they knew who was an engineer; e) expressed solidarity with other social causes related to diversity; and f) expressed enthusiasm for or mentioned the campaign humorously. This study highlights the inherent complexity of identify that arises when people self-express themselves.

Author Keywords

Social media; intersectionality; engineering identity.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Lately, the question of identity and identity expression has started to garner increased interest propelled by social and political changes and by social media that provides a platform for people to engage with others in solidarity or in show opposition. Whether it is *#blacklivesmatter*, *#metoo*, *#genderequality*, or *#fearlessgirl* expressions of identity on social media are becoming commonplace. Decades of

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COMPASS '18, June 20–22, 2018, Menlo Park and San Jose, CA, USA

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ACM 978-1-4503-5816-3/18/06...\$15.00

<https://doi.org/10.1145/3209811.3212700>

scholarship though alerts us that identity is a complex issue. What then can we learn from this renewed focus on identity expression especially as it is occurring on social media? In this paper we present an analysis of identity self-expressions on hashtag campaign #ILookLikeanEngineer that was started with the explicit purpose to allow diverse participants to express their engineering identity. Data from this campaign allows us to better understand how affordances for self-expressions are leveraged by participants. This work contributes not only to social media research, but also to work on intersectionality, and diversity in engineering.

LITERATURE REVIEW

Intersectionality

Intersectionality, a theoretical perspective that emerged from feminist studies, argues that lived experiences and social categories of gender vary, often dramatically, by race, ethnicity, class, sexual orientation, age and other interconnected dimensions of difference and inequality [3, 11, 20]. Coined by legal scholar Crenshaw [10], the term intersectionality emerged from a critique by women of color of gender analyses based on experiences of white, middle-class women that ignored the voices and stories of women of color and those without economic privilege. These scholars argued that gender never operates independently of other markers of identity or dimensions of difference (i.e., race, ethnicity, class, sexuality, age, nationality, etc.). Particular contexts though may make one or another of these markers more or less salient for certain individuals or groups [16].

Although an intersectional approach to identity has now become commonplace across a range of scholarship [9, 15], some methodological and empirical questions remain unaddressed. First, methodologically, there is the challenge of capturing intersectionality through traditional social science data collection methods such as surveys and interviews. These methods have shown to be inadequate as they presuppose categories and it is hard to locate issues of identity cleavage or multiple identities in response to a prompt or allow new categories to emerge [17]. The suggested solution to address this issue is to find personal expressiveness and that has been attempted through content or discourse analysis. The problem with this approach is

often a lack of context around the material being analyzed and figuring out the purpose why the material was created [8-9].

The empirical issue with existing studies of intersectionality is to understand it as an interaction between different analytical levels (micro-macro). As [14] has argued, for a true understanding of an intersectional approach categories must be understood as “dynamic productions of individual and institutional factors” (p. 251), i.e. both at the micro and macro levels. At the personal, individual micro level identity includes more than one social category and has the potential to encompass both marginality (e.g. gender) and privilege (e.g. working at a big firm) at the same time. Individuals understand these multiple categories in relational terms and their self-identification derives from relationships to other categories [2]. At a higher, macro level, individual experience occurs within broader historical and structural contexts (e.g. engineer in Silicon Valley). This situates individuals within specific structures of power and oppression. Here, the intersectional approach guides the analysis towards examination of the mutual constitution of identities, social practices, and structures that produce and maintain hierarchies of difference [3]. One context for examining intersectionality is engineering identity.

Intersectionality and Engineering Identity

Engineering – as a profession and as a professional identity – presents a salient context to examine issues of intersectionality [5]. The lack of diversity in the engineering and technology workforce in the United States has been an area of concern for decades [7, 19]. In spite of significant efforts at the national level and by engineering and technology firms, lack of representation of women, African Americans, and others continues. The arguments for increasing diversity range from an equity and economic perspective to the need for more novel and creative ideas to shape engineering and technology for the future. The work of Cynthia Foor and her colleagues [12-13], focused on young women’s experiences with engineering education, demonstrates that multiple markers of identity and locations within the social structure intersect to create particular experiences in relation to engineering for some young women. In her ethnographic study of an engineering college, Tonso [25] points out that “engineer” is itself a powerful social category that operates to privilege some forms of behavior and marginalize others in particular contexts. The exploration of these intersecting categories provides rich explanations of underrepresentation in engineering. An intersectional theoretical framework is particularly useful for understanding how engineers conceive of themselves. Most research within the intersectionality paradigm has focused on social categories or demographics as the lines across which identity or self-identification crosses. In this paper we examine a different element as it coincides with profession.

Social Media and Identity Expressions

The emergence and popularity of social media has transformed social activism by enabling information dissemination quickly to a large audience [23, 27]. Activists can use networked technologies not only for creating and sharing information but shaping public opinion and planning and calling for action [18, 23]. Digital activism campaigns are not bound within time or place and users can participate and engage without restrictions [13, 27, 28]. Twitter in particular has seen a surge of usage commonly associated with furthering a number of social and political issues [1, 4, 6, 22, 24]. Even though the use of hashtags conveys a collective unified view, there is no empirical investigation of self-expressions and in this paper we extend research on use of social media for activism but using intersectionality. Our work also contributes to the research on intersectionality and finally to engineering diversity.

RESEARCH STUDY

#ILookLikeAnEngineer Campaign

The hashtag activism campaign #ILookLikeAnEngineer was the brainchild of software engineer Isis Wenger [29]. The hashtag was born out of her frustration with how people reacted online to an offline recruitment advertisement by her company OneLogin™ that featured her on billboards on public transport areas. On the Web, many users, mostly male, reacted to the billboard by saying she cannot really be an engineer or that the company used the picture of a female engineer solely to attract male applicants. Isis wrote a blog post about her experience that went viral and called for supporters to coalesce around her efforts to broaden the depiction of what an engineer looks like, hence the hashtag #ILookLikeAnEngineer. She stated in the post that, “At the end of the day, this is just an ad campaign and it is targeted at engineers. This is not intended to be marketed towards any specific gender — segregated thoughts like that continue to perpetuate sexist thought-patterns in this industry.” On August 3, 2015, in addition to posting a tweet she updated her initial blog post to add a call for action and an image with a Twitter hashtag: Do you feel passionately about helping spread awareness and increase tech diversity? Do you not fit the “cookie-cutter mold” of what people believe engineers “should look like?” If you answered yes to any of these questions I invite you to help spread the word and help us redefine “what an engineer should look like.”

Data Collection and Wining

The data was collected in two phases. In the first phase, we collected the dataset using Twitter streaming API based on three seed hashtags – #ILookLikeAnEngineer, #LookLikeAnEngineer, and #LookLikeEngineer – from August 3rd, 2015, the day the hashtag was first used, till October 15th, 2015. In the second phase, we recollected the tweets data from Twitter using Search API a year after the campaign started to have a reliable and streamlined

retweets/favorites count. The final dataset consists of 19,492 original tweets.

To identify tweets within the dataset with self-expressions we used Linguistic Inquiry and Word Count (LIWC), software that is now commonly used for analysis of tweets [21, 26]. LIWC is a word-category lexicon which analyzes the language used in the tweets and quantifies the psychological value of language into 94 different categories of language ranging from part-of-speech (i.e. articles, prepositions, past-tense verbs, numbers,...) to topical categories (i.e. family, cognitive mechanisms, affect, occupation, body,...). For this paper, the value of “I pronoun” category is used to code the tweets which share personal opinion and individual identity. LIWC uses a word count strategy and calculates the relative frequency of words and word stems in a text that fall into a specific category such as first-person singular pronouns (e.g., “I”, “me”, “mine”). The frequency scale ranges from 0 to 100 indicating the percentage of the words in a tweet that are first-person related. In our dataset, this value is from 0 to

55.56 and 3532 out of 19,492 (18.12%) tweets have non-zero value for first-person singular pronouns.

Data Analysis

To analyze the data winnowed using LIWC we used content analysis. Our initial analysis was akin to grounded theory with open coding followed by axial coding. 200 tweets were selected with a pronoun value between 12 and 13. We chose a low value for the initial coding as if a scheme satisfied those values they were likely to work for higher pronoun values as well. Two members of the research team first independently coded 100 tweets to arrive at a draft coding scheme that was discussed and refined. They coded further 100 tweets to ensure that coding was reliable. If they disagreed they discussed the tweet to arrive at a consensus. Next, a further 535 tweets (those with a pronoun value of 17 or higher were coded. Of the total 703 tweets coded, 260 were assigned multiple values. We decided to focus on a higher pronoun value as determined by LIWC for coding as our goal was to look at complex self-expressions that depicted intersectionality.

Table 1: Tweet Categories, Occurrence, and Examples

Categories	N (%age)	Tweet Example
A: Expansion of Engineering Identity	409 (58.1%)	<ul style="list-style-type: none"> My profession let me have a positive life change. I am @Ericsson #SolutionArchitect! #ILookLikeAnEngineer. http://t.co/z9tPquZMlz I am an hijabi, I solve problems and impact lives. I'm a software developer at Andela #ILookLikeAnEngineer cc @Andela http://t.co/7Bp04j09mR #RubyOnRails #RailsGirls #ILookLikeAnEngineer #WomenInTech I-Prefer-Ruby T-shirt http://t.co/2BYQ375Ksc
B: Expression of Institutional Identity	158 (22.4%)	<ul style="list-style-type: none"> At @Cisco, I have no fear for I'm a #Greengineer + #Machineengineer #ILookLikeAnEngineer @CiscoCareers @shr_plus_ha http://t.co/XdOtDJCr5X I've been a Systems Engineer 1/3 of my career, now hiring our next gen SE's @JuniperNetworks. #ILookLikeAnEngineer http://t.co/0RHmPSeXNJ #ILookLikeAnEngineer because I am one! Always knew I was meant to support space exploration & I __it! @BoeingCareers http://t.co/ALHVncCVpj
C: Expression of Personal Identity	141 (20%)	<ul style="list-style-type: none"> I'm a mom, wife, sister, daughter and an automotive engineer. I love auto racing and pedicures! #ILookLikeAnEngineer http://t.co/2uxNbDMwKf My 7 yr old daughter made me a robot so I can clean my face the lazy way. https://t.co/xkJCAzmUDj via @YouTube #ILookLikeAnEngineer I cook, I row, and I am a budding psychologist. I also help build @fitbit's commerce platform. #ILookLikeAnEngineer http://t.co/g86CkqTSfl
D: Expression of Being an Ally	70 (10%)	<ul style="list-style-type: none"> My fellow engineer, @stacyannwalker3, whom I love dearly! #blackoutday #blackgirlmagic #ILookLikeAnEngineer http://t.co/xKlkgtpzYO I wonder what @Elise_Andrew & @IFLScience think about #ILookLikeASurgeon #ILookLikeAnEngineer #ILookLikeAPhysicist #ILookLikeAUrologist ???? For my buddy, @cstritter !! ??? #NationalBowTieDay #ILookLikeAnEngineer http://t.co/roUPNLm7fP
E: Expression of Identification with Social Causes	56 (7.9%)	<ul style="list-style-type: none"> I love Us #selfie #art #ILookLikeAnEngineer #BBWLA #hiphop #laughingwhileblack #twitart #BlackLivesMatter http://t.co/W8t0ZLmXKm My precious #theclock #StandWithAhmed #ilooklikeanengineer #TrustInFuture #SayNoToIslamophobia http://t.co/LqqCTvjMhw #ILookLikeAnEngineer because I am an engineer #phd #engineer @smrtgrls #WomenInSTEM #womeninscience http://t.co/Vbd6uHW5cS
F: Others (enthusiasm, humor, self-promotion, etc.)	170 (24%)	<ul style="list-style-type: none"> i just love this #ILookLikeAnEngineer wave shit gives me hope I love the #ILookLikeAnEngineer tag, ?? I wish it existed sooner. @ltshella_dom: What do you call a fake noodle? An im-pasta! And that's what I thought I was #ILookLikeAnEngineer

FINDINGS

Expansion of Engineering Identity

A majority of tweets (58.1%, N=409; Table 1) expanded on participants' engineering identity. Participants referred to their specific engineering project, their domain, and even what their work as engineering means for them and for others (e.g. "My work makes cars more efficient"). Common among tweets was a reference to being a developer, software engineer, or programmer, which reflected the Silicon Valley origins of the campaign. Not surprisingly, reference to programming languages such as PHP, and C# was also present. Other domains referred to include biomedical, automotive, and transportation. Tweets also included details related to actual tasks such as designing, writing product reviews, and coding. Overall, being defined not just as an engineer but a specific kind of engineer that does particular tasks seemed important in identity self-expressions.

Expression of Institutional Identity

Next, 22.4% (N=158) of tweets, made a reference to a company or an institution. These references to a company, usually the participants' employer, occurred just in and of themselves but also in relation to company hiring or some other action that the company had taken. We had observed that a large number of companies had participated in the campaign through their official Twitter account and it is quite possible that those tweets motivated their employees to participate in the campaign. Overall, this category indicates the integration of the engineering profession and hence an engineering identity with engineering institutions.

Expression of Personal Identity

20% or 141 tweets referred to personal aspects of participants' lives including their family and their hobbies (e.g. "I'm an engineer & COO. I'm raising smart girls & building a smarter grid"). References to being a parent (mother or father) were present as well as reference to siblings and children who were engineers. Among hobbies, references were made to photography, cooking, traveling, arts, keeping fit, etc. (e.g. "I am living my purple life with technology, travelling, art and my little kitties").

Expression of Being an Ally

Within social movements it is common for the core constituency to attract support from others. This campaign was no different, 10% or 70 tweets within the analyzed corpus were not from participants that were engineers themselves but who were supporting either someone in their family or a friend or sometimes just the cause (e.g. "My best friend the Medical Engineer helping me with the car"). There were tweets from other professionals as well indicating their support for engineers.

Expression of Identification with Social Causes

Almost 8% (N=56) of tweets referred or linked to a social cause in addition to the #ILookLikeanEngineer campaign. Participants expressed solidarity or support with many other causes including #BlackLivesMatter and related campaigns;

other campaigns related to gender diversity such as #WomenInStem, #GenderEquality, #LikeaGirl, among others; and also to campaigns related to LGBTQ issues. Participants also made statements such as "I celebrate femininity." Overall, even though the tweets were focused on an engineering identity, the larger theme of diversity found self-expression as well.

Other

Finally, 24% or 170 tweets expressed sentiment not directly related to identity but nonetheless was a self-expression. One of the most common sentiments was enthusiasm for the campaign and the tweet contained reference to being excited or loving the campaign. In addition, many tweets included some form of humor. Finally, many participants used their self-expression to promote themselves or their participation in the campaign (e.g. "read my blog post"). We wanted to capture these expressions as they contributed to the overall campaign by engage participants.

DISCUSSION AND CONCLUSION

The findings of this work demonstrate the complex nature of self-expressions employed by participants in a hashtag campaign for engineering diversity. Consistent with an intersectionality perspective, participants expressed themselves in categories other than "engineer". Even in relation to their engineering identity, they expanded upon it by highlighting specific domains and projects they were working on. Participants also reflected on their institution and organizations, showcasing the interplay between the micro and macro foundations of an intersectional identity. They used tweets to talk about their personal lives including their family and their hobbies. The importance of societal influence on personal identity was evident in participants' reference to other social justice causes in their tweets. Finally, our analysis revealed an interesting aspect of self-expression whereby allies, those who were not engineers themselves but still wanted to show support to the campaign, used the hashtag to express their solidarity. Participants also expressed themselves in other ways by showing their enthusiasm and even leveraging the campaign for self-promotion. This study contributes to an understanding of how social media campaigns allow self-expressions and illustrates a new methodological tool for researchers using an intersectional lens to better capture self-expressions [30]. It alerts those engaged in increasing the diversity of underrepresented populations in engineering by showcasing the complexity of an engineering identity.

ACKNOWLEDGMENTS

This work was partially funded by NSF Awards#DUE-1707837 & EEC-REU-1741754.

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