



## **Female Millennial Perceptions of Engineering's 'Brand'**

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Her projects have been featured on Canada AM, in the Toronto Star, the Grid, MIT news and been applauded by the White House. As a passionate city builder advocating for youth, inclusive communities and a vibrant arts scene, she was named a 2012 DiverseCity Fellow of Civic Action and the Maytree Foundation.

## **Female Millennial Perceptions of the Engineering Identity**

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# Female Millennial Perceptions of the Engineering Identity

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## 1. Introduction

Gender imbalance persists in engineering education. For over two decades, universities in North America have struggled to increase female enrollment above 20 percent of their student body.<sup>1</sup> Especially stark is the number of female students in mechanical, electrical, and computer engineering – with reported figures as low as 5 percent. Gender imbalance within the engineering student population (the source of talent for the profession) results in an even greater imbalance within the sector. In a world half populated by girls and women, many have questioned how the engineering sector (herein referred to as “the engineering community”) can legitimately claim it is solving complex societal problems when its professionals do not adequately represent the values and perspectives of our whole society. Fundamental to this paper is the belief that society at large will benefit from gender balance in engineering education.

One practical problem exists. Simply put, we need to improve the rate at which girls select and successfully complete certain prerequisite courses in high school (e.g., physics and math). These are gateways to post-secondary engineering programs. Our paper responds to the problem by looking at why teenage girls with an interest in and aptitude for science, technology, engineering, and math (STEM) opt out of engineering pathways. Our approach is to present a Toronto-based project that took a “for girls, by girls” approach.

We argue that girls are unlikely to choose engineering pathways unless they can identify with the engineering profession. Traditional engineering stereotypes have failed to capture the imagination of adolescent females – essentially, by failing to capture the unique political, economic, cultural, and social impacts made by engineers as professionals and as people; and specifically, by failing to articulate the role engineers play in making the world a better place.

In other words, one (perhaps *the*) major factor in low enrollment is the lack of an aspirational, female-inclusive engineering identity. This paper argues that such an identity – in order to resonate with Millennial adolescent girls – must include a role in the betterment of society.

A project based at Ryerson University – empowering girls, themselves, to create a female-inclusive engineering identity – gave us the insight and model for our paper. The project involved two components: a *branding project*, led by graduate students enrolled in the Professional Communication program at Ryerson’s Faculty of Communication and Design; and a *youth think tank*, comprised of 36 female teenagers from high schools in the Greater Toronto Area. The project – part of the collaborative partnership WEMADEIT – was envisioned by faculty and staff from Ryerson University’s Faculty of Engineering and Architectural Science (FEAS), and by Groundswell, a youth engagement and communications firm, which herein referred to as “the project team.”

We are not the first to identify the engineering identity problem. Our paper presents a literature review of research and program evaluations on the public perception of the engineering identity and its role as a barrier to female participation. It also includes a review of outreach and awareness campaigns that have employed key messages and images to engage female adolescents in engineering. Youth-led initiatives, like the one described in this paper, have grown in popularity due to their ability to both demystify the systems of marginalization and empower youth to redefine and engage in those systems in new ways. Even so, the “for girls, by girls” approach – as described here – seems to be unique. Our research uncovered no other project of its kind. The WEMADEIT brand and youth think tank resulted in key findings and recommendations for the engineering community to consider in its effort to address the persistent gender gap.

## **2. Literature Review**

The body of research on female participation in STEM is large and growing. For the purpose of this paper, we have reviewed literature on the engineering identity as a major contributor to the gender imbalance in STEM. In doing so, we have reviewed research on the public perception of the engineering identity and efforts to employ more “female inclusive” messaging in engineering outreach campaigns – as targeted toward a female Millennial demographic.

### **2.1. Public perception as a major barrier to female engagement in engineering**

Public understanding of engineering, regardless of gender, is extremely poor. Students view STEM subjects as “uninteresting, difficult and unrewarding” and equate STEM with “negative stereotypes such as ‘geeky’ and ‘nerdy.’”<sup>2</sup> For many students, the cultural and identity tropes associated with mathematicians and scientists are not desirable.<sup>3</sup>

One’s understanding of a professional identity is closely tied to exposure. The degree to which engineers lack direct interaction with people, both in real life and in media, has contributed to a negative stereotype of engineers as isolated technocrats. This identity runs counter to the aspirational identities of most adolescents, but is especially unappealing to girls.<sup>4</sup>

### **2.2. Efforts to use messages and images to convey an engineering identity**

In 2009, Canadian researchers Chan and Fishbein stated that “engineers need to embrace a broader vision of their professional role as a response to two inexorable developments: globalization and global issues reaching critical levels (e.g., global warming, extreme poverty, rising health care costs). All cry out for engineering input.”<sup>5</sup> Engineers play critical roles in developing technical solutions to complex political, economic, environmental and cultural challenges. Unfortunately, the engineering community fails to capture the same ‘share of voice’ or public attention for their role, when compared to other professions (ex. policy makers, economists and scientists). If the role of engineers in society continues to fade from public consciousness, it will negatively impact post-secondary engineering outreach and recruitment and we will fail to attract the next generation of creative and talented engineering students.

Chan and Fishbein identified a shift in engineering education in response to the engineering identity issue. In 2008, for example, the Canadian Engineering Accreditation Board changed its requirements for graduate outcomes, putting a greater emphasis on the need for graduating engineers to understand the role of the engineer in society; professional ethics, accountability and equity; the impact of engineering work on society and the environment, as well as teamwork and communication skills.<sup>6</sup>

In 2013, the National Academy of Engineering (NAE) of the United States published a report called “Messaging for Engineering: From Research to Action.”<sup>7</sup> This research-based effort, to develop and test more effective messages about engineering, identified four new messages:

- *Engineers make a world of difference.* From new farming equipment and safer drinking water to electric cars and faster microchips, engineers use their knowledge to improve people’s lives in meaningful ways.
- *Engineers are creative problem solvers.* They have a vision for how something should work and are dedicated to making it better, faster, or more efficient.
- *Engineers help shape the future.* They use the latest science, tools, and technology to bring ideas to life.
- *Engineering is essential to our health, happiness, and safety.* From the grandest skyscrapers to microscopic medical devices, it is impossible to imagine life without engineering.

These and other recommendations to “change the conversation” or “embrace a broader vision” of engineering bespeak a realization that the profession is not well understood or reflective of the society it serves. Organizations in the engineering community have tested female-inclusive applications and strategies in outreach and awareness efforts with limited success. The *authentic adult* (i.e. *Baby Boomer Generation*) *feminine STEM role model*, while well-intentioned, can sometimes convey an unattainable level of success that is threatening to young girls.<sup>8</sup> The NAE’s “Changing the Conversation” report (2008) provided examples of organizations that had created *fictional young feminine STEM role models*<sup>9</sup> in which engineering students are posed as guitar players or superheroes in an effort to convey a more exciting or well-rounded engineering identity. Others have employed soccer players and fashion bloggers to vouch for how “cool” STEM can be.<sup>10</sup> Unfortunately, efforts to update and broaden the engineering identity have focused too much exclusively on the career aspects of the profession (ex. an engineer at work) or employed ineffective adult interpretations of what is desirable to young people (ex. rock star). They ultimately lack the authenticity, relevance, and ultimately, the social and environmental justice elements that many female Millennial adolescents seek.

### **2.3. Perspectives on female adolescents from the Millennial Generation**

A female-inclusive engineering identity must reflect an understanding of the unique time in which female adolescents have been raised and are now living. This paper focuses on the

Millennial Generation – people born between the 1980s and the early 2000s, and who can be characterized by the following traits:

1. **Special** – they feel that their input is vital for the future of the world;
2. **Sheltered** – they have been protected by their parents, government, and teachers;
3. **Confident** – they have high levels of trust and optimism towards themselves and the future;
4. **Team-oriented** – they have high team-oriented skills due to learning and community service;
5. **Conventional** – they seek out norms and structure;
6. **Pressured** – due to influence from parents, they feel pressure to excel at everything they do; and
7. **Achieving** – they have become a generation focused on achievement.<sup>11</sup>

According to Schreiner and Sjoberg, “The spirit of the age and the predominant zeitgeist, ideas and values in society have major influences on young people’s thinking about and understanding of the world, their surroundings and themselves.”<sup>12</sup> Gender adds another layer of influence. Girls, for example, tend not to see physics as relevant to their lives; they find it challenging and obscure.<sup>13</sup> “Young people, especially young girls, although they appreciate technology, would rather like to have an identity that conveys late modern post-material values. Such values might be self-realization, creativity and innovation, working with people and helping others.”<sup>14</sup> For the engineering identity to resonate with civic-minded Millennial females, it must convey the role engineers play in fostering a strong sense of community, both local and global.

### 3. WEMADEIT Program Description

In Spring 2013, four faculties of engineering (Ryerson University, University of Ontario Institute of Technology, University of Waterloo and Western University) and Hydro One, the largest electricity transmission and distribution company in Ontario, Canada, launched a four-year partnership to increase outreach, support, and networking opportunities for young girls and women in engineering. Hydro One gifted \$1.4 million, and committees comprised of senior leaders (e.g., deans, associate deans, vice presidents) and university engineering outreach professionals (staff, female engineering faculty, corporate community investment managers, female professional engineers, and female university engineering students) were created to oversee the partnership.

Young girls in grades 9 to 11 were identified as a target demographic because of the rate at which they are opting out of academic math and science classes and, often unknowingly, closing their options for engineering in post-secondary education. As such, the primary target group identified became girls who had the aptitude for STEM subjects but who were not choosing STEM courses

in grade 10. The secondary target was the girls' key influencers: parents, teachers, guidance counselors, and peers. The overall program was later named WEMADEIT.

Members of the partnership took on projects that played to their institutional strengths in fields outside of engineering. For example, Western University led the development of teacher training programs. Ryerson's Faculty of Engineering and Architectural Science (FEAS) oversaw various aspects of brand guideline development, a youth think tank, website development, social media management, and the creation of an insight report on key findings from the process. FEAS enlisted the support of a project manager, a professor in the Faculty of Communication and Design, a consultant with expertise in user-centric design, a web developer, and several interns.

The Ryerson WEMADEIT project employed a decidedly "for girls, by girls" approach in the development of a brand and marketing material, with the goal of broadening the engineering identity. The project had two key phases: brand development and a Youth Think Tank (YTT). Both phases and related methodologies are described below.

## **Timeline**

1. WEMADEIT program development began in March 2013 / public launch in September 2013.
2. Literature review: March to September 2013.
3. WEMADEIT brand development with Professional Communications graduate students: September to October 2013.
4. Interns hired to develop first iteration of brand guidelines: January 2014.
5. YTT recruitment phase: January to February 2014 / operational phase: March 22 to April 26, 2014.
6. Website and social media development. Soft launch for YTT feedback and public launch: April 2014.

### **3.1. WEMADEIT Brand Development**

#### *Description*

The aim was to design a female-inclusive brand for the initiative. Professional Communication graduate students were chosen for two main reasons: First, they had the skills to conduct demographic research that would inform the brand development, from envisioning the brand to selecting and creating the collateral required (e.g., fonts, typefaces, colors, applications); second, they were close enough in age to recall what factors had impacted and influenced their own adolescent identity formation and decision making.

The students were given the following directions:

- use messages that research has shown will be most effective in reaching young girls;

- avoid iconography or imagery that serves to entrench pre-existing harmful stereotypes (e.g., white men in hard hats, over-achieving female STEM role models);
- support an engineering identity that is more than just a job or career; examine political, economic, environmental, and cultural facets of the engineering identity;
- use digital channels (e.g., web, social media);
- target girls with an aptitude for STEM who had not identified an interest or were repelled by engineering (a tall order but necessary, given that we wanted a brand that would engage the “un-engaged” and be embraced by female engineers).

### Methods

Twenty-three students (in their early and mid-twenties) were tasked with creating brand guidelines; of these, the top students were eligible to apply for a paid internship to complete the development of the brand guidelines for use by the university/Hydro One partnership.

The class was given a two-hour presentation on background issues: statistics, imagery and stories related to the field of engineering, low female enrollment, past and present notable women in engineering, the findings and key messages of the National Academy of Engineering (NAE), images of stereotypes held by girls and boys, information on the Millennial Generation, and examples of other efforts to rebrand professions in an effort to increase awareness and interest.

The students were also asked to conduct research, and to reflect on their own experience as a grade 9/10 student; to interview and/or observe grade 9/10 girls to ascertain their likes, dislikes, and concerns; and to review media targeted at (or consumed by) grade 9/10 girls.

The assignment was divided into two parts:

1. an initial “client” presentation (to the class and a panel of three experts) in which students presented a design concept and an explanation of the rationale for their choices of color, font, tone, and imagery. They received feedback from the experts and peers.
2. a final presentation that incorporated feedback and provided the client with a complete brand guidelines package.

All students were able to apply for the internship, but three of the strongest students were invited directly. Two were finally chosen due to the youth-centric nature of their projects. One student designed her brand in response to teen behaviours and styles she saw while observing teens at the mall. Another focused on the use of social media (specifically Instagram) to enlist girls to reveal what real engineers do on the job and in their spare time.

The two interns combined their ideas to create the WEMADEIT brand. Over four weeks, they developed guidelines that described the ambitions, core principles, voice, and tone of the brand. They created a logo, wordmark, tagline, symbols, color palate; they chose typography and a type system. The brand was tested in Facebook, Instagram, and PowerPoint; on the Web; and in



letterhead, signage, newsletters, and teen-centric swag (ex. sunglasses, phone cases and necklaces).

### **3.2. Youth Think Tank (YTT)**

#### Description

The YTT was envisioned as a creative framework enabling high school girls to reveal their insights about the following topics:

1. What do high school girls care about now and in the future?
2. How do high school girls make decisions?
3. How do high school girls communicate and how do they expect to be communicated with over new media?
4. How might we make information more visually compelling for high school girls?
5. How do high school girls perceive engineering?
6. How might STEM be in conflict with high school girls' feminine identities?

#### Methods

The project team employed a user-centric design process to inform YTT development.<sup>15</sup> The YTT was designed to reveal the political, economic, environmental and cultural beliefs, behaviours and motivations of the target demographic (teen girls) in order to create a communications strategy that would be customized to fit the needs of the challenge (creating a fresh and authentic way to engage teen girls in engineering). To accomplish its goal, the YTT would:

- test assumptions about Millennial teen girls;
- enlist Millennial teen girls to develop creative solutions for engineering outreach;
- identify patterns in teen girls' proposed solutions;
- create and test potential design solutions with teen girls;
- iterate based on user feedback.

#### *a. Youth Think Tank Recruitment and Selection*

Recruitment for the YTT took place over four weeks. Recruitment materials used the WEMADEIT brand and outlined the opportunity for high school girls (in grade 9 or 10 at the time of application) to serve as members of the YTT, to earn a small fee, and to provide insights into the gender imbalance in engineering.

The materials were distributed to high school teachers, guidance counsellors, and STEM advocates via email and social media. The project team also made personal visits to drop off recruitment materials to math and science teachers in 25 schools in the Greater Toronto Area. As a result, 150 girls submitted an online application. Of these, 38 were invited to join the YTT.

### *b. Youth Think Tank Training*

Thirty-eight girls were initially deemed able, in terms of both capacity and interest, to participate in the project. They were offered a letter of employment stipulating 2.5 hours per week over ten weeks, for a total of \$250. (While 38 girls signed a contract, two were released from the project after the first week for failing to submit their assignments.)

The YTT members were trained in the basics of qualitative research and practical interview skills. They were then asked to place themselves in one of four themes called Lightning, Gears, Cubes, or Droplets, respectively, according to their interests:

1. **Lightning:** How do girls' feelings about femininity impact decisions they make about their future? (9 members)
2. **Gears:** How do girls communicate, on and offline? (8 members)
3. **Cubes:** How do images and their political, economic, cultural, and social associations affect the way girls perceive their meaning? (10 members)
4. **Droplets:** What do girls know about engineering and what do they want for their future? (9 members)

Note that the YTT members represented a range of educational and ethnic backgrounds, diverse areas of interest in both sciences and the arts, and varied levels of prior exposure to engineering. This was not deliberate; it simply reflects the diversity of the Greater Toronto Area.

### *c. Project Operation*

Over ten weeks, the YTT members were asked to submit three types of assignments:

1. a survey created by the project team and filled out by YTT members. The weekly survey results provided insights into teen girls' thoughts, motivations, behaviours, desires, and language choices. The results provided an immersion into the cultural world YTT members were inhabiting and a better understanding of the language of teen girls.
2. interviews that varied week to week involving peers, teachers, or parents. YTT members completed two weekly interviews with a variety of demographics, resulting in 612 total interviews.
3. a creative assignment called a "COLAB." These were customized for each group to gather specific insights for its theme area (identified above). The content was created by the YTT members and later translated into web content for WEMADEIT.ca by the project team.

## 4. Project Limitations

The WEMADEIT project team met with the YTT members in person at the training session. All other interaction was online until the graduation ceremony at the project's end. As students, members of the YTT could only legally work on evenings and weekends, so communicating in real time (even online) was not possible. This may have limited the insights we were able to gather.

The YTT was composed entirely of female adolescents, which meant that male perspectives were included only via interviews conducted by YTT members. Both the project team and the YTT members agreed that, could we have done anything differently, we would have created a co-ed YTT.

And finally, interviews relied heavily on volunteers who sometimes did not fulfill their commitments.

## 5. Results

### 5.1. Phase 1: Brand

The WEMADEIT brand guidelines introduced the mandate: “WEMADEIT needs to be young, current and fun. The brand creators reasoned that in order for a brand to appeal to the target demographic (Millennial teens), it would in fact need to target a demographic slightly older so that would be perceived as cool and aspirational. The brand would also need to provide accurate information about engineering, but will do so in a way that appeals to teen girls. They do not want a lecture, they want a conversation. We're talking with girls, instead of talking at them.”

The guidelines outline **three core principles**:

1. Present a unified voice: Research shows that girls want credible information, but are not attracted to anything too corporate. If they're presented with something that is not authentic, odds are they will not be interested. That means our brand needs to be sincere, reliable, and relatable.
2. Keep it young, current, and fun: Engagement is key, so keep it clear and concise, and do not be afraid to have a little fun.
3. No pressure: The purpose is not to push girls into engineering; the choice is up to them. We are, however, determined to decrease the stigma surrounding engineering. We aim to provide girls with a better understanding of political, economic, cultural, and social facets of engineers' personal and professional lives, as well as what their lives could be like if they decide to pursue engineering. We're not asking them to figure out their future, we're just helping them keep their doors open.

Most importantly, the brand guidelines identified **two different voices** (each with a distinct tone) to serve as the personality for WEMADEIT.

### **Debbie: The Young Professional**

The goal was to create a voice that was clear and genuine, while conveying a sense of fun and wittiness. This voice was inspired by Debbie Sterling, founder and CEO of GoldiBox. For WEMADEIT, Debbie serves as the voice of the young professional girls want to be. She's in her late twenties – an age that high school girls can imagine for themselves. She's trendy, but approachable and intelligent. She genuinely cares about the well-being of her audience. It's her passion to show these girls how amazing a career in engineering can be, and how much the sector needs them. She's the voice of the website, giving girls unbiased information.

For example, Debbie would say: *“Life as an engineer is always exciting and busy. Check out these pictures – they'll show you what a day in the life of a real engineer looks like!”*

### **Zoe: A “Could-Be” Engineer**

Zoe is funny and curious. She's never seriously thought about engineering and isn't sure if it's her cup of tea – but she's got an aptitude for STEM and is more than willing to explore her options. She's spunky, creative, and social. She's in the process of discovering her identity and is trying to find a university major that will align with her interests.

Zoe says: *“So apparently it's possible to be as creative in engineering as it is in art and writing - who knew?”*

The guidelines included a mood board, logos (e.g., how they should be spaced, positioned, etc.), taglines (“We made a difference. We made it together. We made it”), symbols, typography, headings, and photography guidelines; they provided examples of what the brand would like in different applications (e.g., on Facebook, a T-shirt, letterhead, etc.).

## **5.2. Phase 2: Youth Think Tank**

The participatory researchers (YTT) sourced and developed an enormous amount of content that revealed the political, economic, cultural, and social nature of engineers' personal and professional lives.

### Surveys and Interviews

- YTT members completed 360 surveys that helped the project team understand how to communicate with them, what their unique perspectives on being a student, the future, making decisions, careers, university, STEM.
- They interviewed 100 female engineers, 26 engineering students, 7 engineering romantic couples, and over 700 peers, parents and teachers to develop insights about perceptions of engineering, communicating with teens and gender issues and STEM.

### Digital Media

- They reviewed 18 TED talks about engineering;
- Shared 108 favourite engineering movies and 72 favourite engineering songs; and
- Played and rated 18 engineering related computer games.

### Images

- dream dorms (36);
- dream workplaces (36);
- the university of their dreams (22);
- future dream colleagues (20);
- where they'd like to live one day (20); and
- cool engineering projects (20).

### Creative Projects

- 10 journey maps of real female engineers' journeys;
- 40 posters for teens advertising a summer engineering program;
- 40 posters for parents advertising a teen summer engineering program;
- 18 inspirational collages of what life as an engineer could be like; and
- 21 user experience journeys for teens who visit WEMADEIT.ca.

### Writing and Research projects

- They wrote 15 lesson plans for teachers to use WEMADEIT.ca;
- Described 12 types of engineering disciplines;
- Researched 50 university engineering pranks or traditions; and
- Researched 150 contemporary engineering projects led by women.

## **5.3. WEMADEIT.ca and WEMADEIT.ca/community**

In order to meet the distinct needs of both teen girls and our stakeholders, the project team designed two online properties. WEMADEIT.ca site is youth focused, while WEMADEIT.ca/community is targeted towards teachers, parents, guidance counsellors and other adult stakeholders.

WEMADEIT.ca consists of six major webpages with distinct headings:

1. *About* explains the purpose of the project and introduces the YTT members.

2. *engSPIRATIONAL* was created in response to the emphasis the girls placed on wanting to feel like they're "making a difference" in their careers. It features interviews with professional engineers conducted by the YTT, as well as engineering TED Talks reviewed by the YTT, and infographic careers maps of engineers whose lives have taken them on exciting journeys in engineering.
3. *weTHINK* tells the stories of the YTT, including their thoughts about gender, their current experiences, their future and issues they care about.
4. *More2Life* features fun articles, quizzes, games, videos, and music related to engineering.
5. *Getting There* gives girls who are interested in engineering more information on how they can apply to engineering school.
6. *For Teachers* sends users to [WEMADEIT.ca/community](http://WEMADEIT.ca/community).

[WEMADEIT.ca/community](http://WEMADEIT.ca/community) consists of five major webpages with distinct headings:

1. *About* explains the purpose of the project and introduces the donors and the project team.
2. *Partners* introduces visitors to each of the four partnership universities.
3. *WEMADEIT Projects* tells the story and provides contact information for stakeholders to find out about each university's WEMADEIT project contribution.
4. *Go make it happen* features insights from the YTT, our favourite resources, and information for stakeholders to help students follow an engineering path, and is a place to share more insights about youth centric engagement.
5. *For Students* sends users to [WEMADEIT.ca](http://WEMADEIT.ca).

#### **5.4. Millennial girls and social media**

It's often assumed that reaching out to teens via social media is the answer to engagement; after all, they spend a lot of time online. However, we quickly discovered through recruitment that teens use social media in a unique way. The YTT informed us that it drives them *crazy* when adults post articles and information to their Facebook profiles and other social media. For teens, social media is social. While girls do passively "lurk" on the platforms and sites used by their adult influencers, their main activity is strictly reserved for communication with their friends; for identity building and confirming activities. Given this, the likelihood of girls following and/or sharing WEMADEIT articles or other information on Facebook or Twitter is slim – so we changed tactics.

The YTT made it very clear that parents, teachers and guidance counsellors play an important role in shaping and supporting female adolescent decision-making. Without such influencers exposing them to engineering, many girls will not know enough about the profession even to consider looking into it. Therefore, we designed our Facebook and Twitter accounts to engage

adults – while maintaining the two voices of the WEMADEIT brand: a high school girl and a young female engineer. The platforms push out daily informative articles that talk about our key themes of women in engineering, youth and female empowerment, cool engineering projects, as well as interesting memes, Reddit threads, and videos.

## 6. Key Findings

The following key findings have been selected due to their presence in many aspects of the YTT's work and their uniqueness in the field. These findings were not commonly found in the literature review:

1. Youth-generated WEMADEIT branding was deemed more unique and relatable than other adult-generated efforts (as exemplified by the NAE). Furthermore, the brand developers took pride in their work and began to own their role as ambassadors for the cause. Educational resources and websites do not have to be boring, but many are.
2. The “new” engineering messaging identified by NAE and others represents important advancements in the push to make engineering more female inclusive, but what’s really needed is an expansion beyond the career aspect of an engineering identity. The YTT discovered that young people have a limited capacity to see their future beyond 6 months. Their career identity is both too far from their minds and not something they are willing to define at such a young age. Instead, adolescents crave the freedom to explore new possibilities and associate university life with a time when they will have the opportunity to explore and discover who they really are. For more effective outreach, a better place to start would be to work with young people to articulate and promote what it’s like to be an engineering student (both the academic and social aspects of the lifestyle).
3. A “female inclusive” or “Millennial-responsive” engineering identity should be gender neutral. The YTT members were very clear that the idea of a female-focused or female-exclusive program was not desirable. Millennials are simply not accustomed to being segregated this way; girls prefer to engage with their male peers for a variety of reasons. While many explained that they do not always act and speak the same way around boys as they do their female peers, they recommended that future YTTs be gender neutral because boys can and should play a role in reducing the barriers and social stigmas for girls in STEM.
4. Many girls are confident in their own creative abilities, causing them to be both a) discriminating consumers of marketing material, and b) drawn to activities that play to their artistic strengths. They are attracted to activities that build their confidence, give them the opportunity to express and explore their emotions, and enable them to feel like they are making a positive difference in some way.
5. Teachers and parents are very strong influencers and would benefit from understanding the role that gender norms and identity play in teenage decision-making about educational and career paths.

6. Before creating female-inclusive outreach and awareness programs, the engineering community should invest more time in getting to know their audience. Consider creative, user-centred (or youth-led) initiatives that employ empathy methodology. Furthermore, it is important to factor in the identity formation process. In order to capture the imagination of most teen Millennials, create unique opportunities to explore how engineering identities play into the multi-faceted identities of teens, especially with respect to political, economic, environmental and cultural values. These efforts should be offered as a precursor to activities focused solely on engineering theory.
7. Teen Millennials crave unique social experiences that can be shared with their peers. The WEMADEIT YTT was identified by its members as a unique and special opportunity that they enjoyed and were grateful to be a part of. In order to achieve engagement and empowerment objectives, more creative and outside-of-the-box activities should be developed.

Note: The WEMADEIT project team posed questions to the YTT members for which there are no clear or easy answers. The team encourages those interested to visit [www.wemadeit.ca](http://www.wemadeit.ca) to explore the ideas, dialogues, art, and other digital content contributed by the YTT and members of the engineering community that were interviewed throughout the process.

## **7. Recommendations**

**When attempting to create female-inclusive outreach and awareness communication material, it's important to ask the following questions:**

1. Are you talking with girls or at them?
2. Who is your specific audience for this piece of content? Whose mind are you trying to change? What do they care about? What are their pain points that you can solve? What will they not tolerate? How might you break through noise of every other message?
3. What is the tone and voice? Is the information you're sharing coming through as a relatable character? Who is talking and what is the reason they are sharing?
4. Does your word choice reflect the specific audience for the message and the brand?
5. What images have you chosen to tell your story? Does each image work together and independently to enhance your message? Are they relatable to the audience?
6. How are you incorporating language, images and media to be compelling and contemporary (aka avoiding walls of text)?
7. Is the channel(s) you've chosen the most appropriate for the message and the audience?



## 8. Conclusion

At the graduation ceremony for the YTT, the members stepped up to a podium in front of their fellow members, parents, friends, and representatives from the engineering community whom they had interviewed throughout the process. Here is an excerpt from one girl's speech:

*I applied to the Think Tank as soon as I heard about it. I'd considered engineering as a career path but I didn't know much about it. Friends and family all seemed to "know" that engineers were men. When I showed proficiency in the sciences my teachers suggested I pursue a career in medicine or education, but never engineering. Meanwhile male classmates were told about engineering programs in the area. When I discovered this I found that I wasn't mad, just confused. Why them and not me? It may not have been on purpose but things like that can change the course of a girl's future. It may have changed mine. It was moments like those in grade 10 that inspired me to take a serious look at gender stereotypes and why they hold so much weight. So when I heard about what WEMADEIT was planning to do, I HAD to apply and it gave me some of the best experiences of my young life.*

The WEMADEIT project offers a youth-led response to the lack of public understanding about the engineering profession and the identity of the professionals who make up the engineering community. In order to reduce the current engineering identity perception barrier, outreach and awareness efforts should be rooted in an understanding of both the imaginations and inherent potential of a key target demographic (female teen Millennial), as well as the unique political, economic, cultural, and social impacts made by engineers as professionals and as people. The project offers a new model for engineering outreach and awareness that can help overcome the negative stereotypes and stigmas associated with a “could-be” female engineer. If more young women begin to see themselves as *could-be* engineers, they will potentially enrich the profession and help it more accurately reflect the society it serves.

## Bibliographic Information

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<sup>1</sup> Engineers Canada, “Canadian Engineers for Tomorrow: Trends in Engineering Enrolment and Degrees Awarded 2009–2013” (November 2014); Statistics Canada cited by the Association of Universities and Colleges of Canada, “Trends in Higher Education: Volume 1 – Enrolment” (AUCC: June 2011), p. 14.

<sup>2</sup> The Institution of Engineering and Technology, “Studying STEM: What Are The Barriers?” (IET: 2008).

<sup>3</sup> J. Boaler, “The Development of Disciplinary Relationships: Knowledge, Practice, and Identity in Mathematics Classrooms,” in *For the Learning of Mathematics* 22, no.1 (2002): 42-47; A. Cleaves, “The Formation of Science Choices in Secondary School,” *International Journal of Science Education* 27, no. 4 (2005): 471–86.

<sup>4</sup> American Association of University Women, “Why So Few: Women in Science, Technology, Engineering, and Mathematics” (AAUW: 2010); H. Haste, “Science In My Future: A Study of the Values and Beliefs in Relation to

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Science and Technology Amongst 11–21 Year Olds,” (London: Nestlé Social Research Programme, 2004); C. Schreiner and S. Sjoberg, “Science Education and Youth’s Identity Construction: Two Incompatible Projects?” in *Re-emergence of Values in the Science Curriculum*, ed. D. Corrigan, J. Dillon, and R. Gunstone. (Rotterdam: Sense Publishers, 2007) [231-248]; M. Vetleseter Bøe, E.K.Henriksen, T. Lyons and C. Schreiner, “Participation in Science and Technology: Young People’s Achievement-related Choices in Late-Modern Societies,” *Studies in Science Education* 47, no.1 (2011): 37–72.

<sup>5</sup> A. Chan and J. Fishbein, “A Global Engineer for the Global Community,” *The Journal of Policy Engagement* 1, no. 2 (May 2009). p. 5

<sup>6</sup> A. Chan and J. Fishbein, *ibid.* p. 5

<sup>7</sup> National Academic of Engineering, “Messaging for Engineering: From Research to Action” (National Academies Press, 2013).

<sup>8</sup> P. Lockwood and Z. Kunda (“Superstars and Me: Predicting the Impact of Role Models on the Self,” 1997) cited by D.E. Betz and D. Sakaquaptewa in “My Fair Physicist? Feminine Math and Science Role Models Demotivate Young Girls,” *Social Psychological and Personality Science* (November 2012) [p. 4] Vol. 3, No. 6, pp. 738-746.

<sup>9</sup> National Academic of Engineering, “Changing the Conversation: Messages for Improving Public Understanding of Engineering” (National Academies Press, 2008)

<sup>10</sup> M. Andree and L. Hansson, “Marketing the ‘Broad Line’: Invitations to STEM Education in a Swedish Recruitment Campaign,” *International Journal of Science Education* 35, no 1 (Jan 2013): 147, 166.

<sup>11</sup> W. Strauss and N. Howe, *Millennials Rising: The Next Great Generation* (2000) New York, Vintage.

<sup>12</sup> C. Schreiner and S. Sjoberg, in *Re-emergence of Values in the Science Curriculum*, ed. D. Corrigan, J. Dillon, and R. Gunstone. (Rotterdam: Sense Publishers, 2007): p. 232.

<sup>13</sup> J. Andrews and R. Clark, “What Do Schoolgirls Think of Engineering? A Critique of Conversations from a Participatory Research Approach,” *Proceedings of the American Society for Engineering Education Conference* (June 2014), available at <http://www.asee.org/public/conferences/32/papers/9208/view>. (last accessed on February 9, 2015)

<sup>14</sup> Andrews and Clark, *ibid.*

<sup>15</sup> C. Cahill, “Doing Research with Young People: Participatory Research and the Rituals of Collective Work,” *Children's Geographies* 5, no. 3 (2007): 297–312.