



# Systematic inequalities in Engineering – (School to Professional Engineering)



**YPF**

Young Professionals Forum

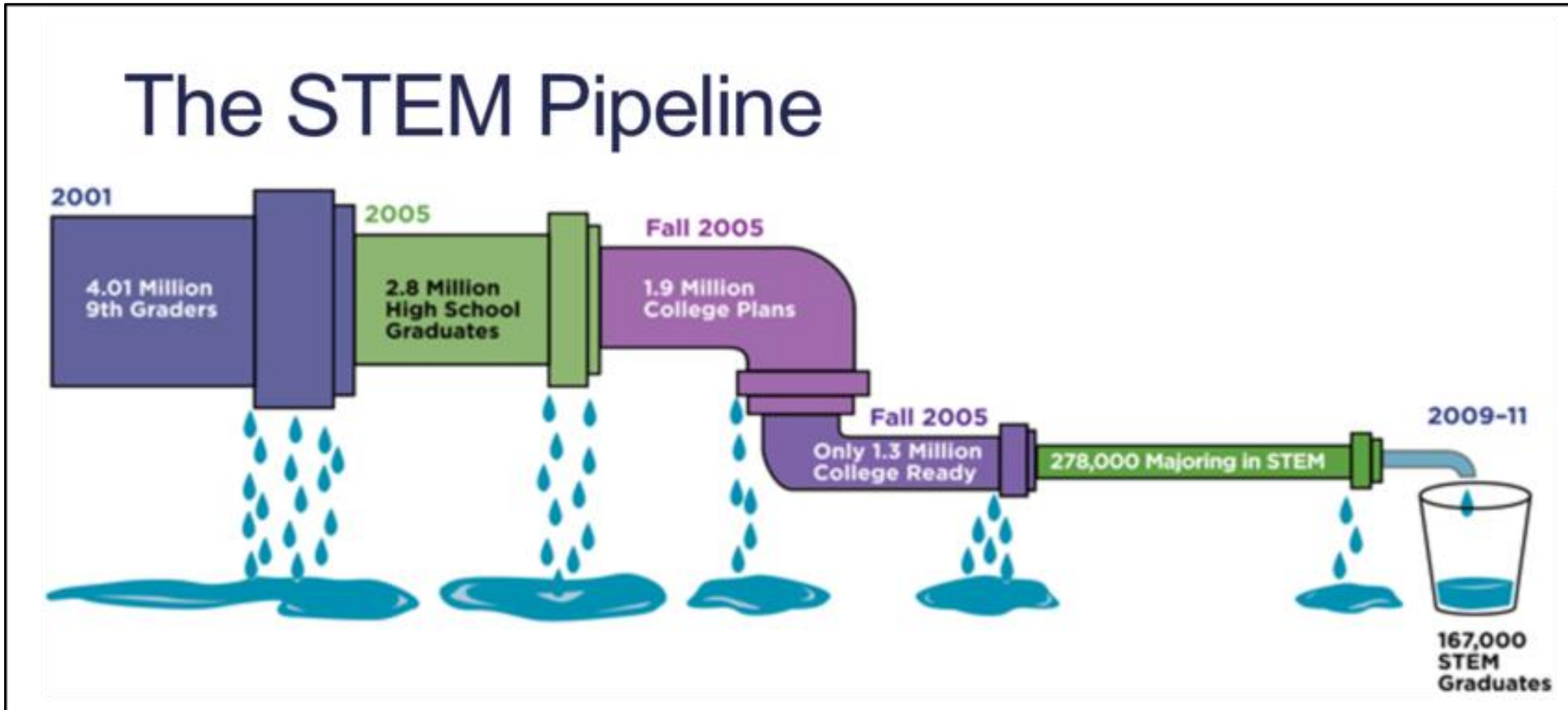
Shilpi Jain, Senior Civil Engineer

August 2021

#YPIMBIZO



# The Engineering Pipeline



Source: Motivating Students' STEM Learning Using Biographical Information

(Janet N. Ahn, Myra Luna-Lucero, Marianna Lamnina, Miriam Nightingale, Daniel Novak, Xiaodong Lin-Sielger)

Reprinted from Engage to excel: Producing one million additional college graduates with degrees in science, technology, engineering, and mathematics, Table C-6, The STEM pipeline [Online image], (2012). Retrieved from <http://www.achieve.org>. Copyright [2012] Washington, DC: President's Council of Advisors on Science and Technology.

# Schools and early education

- Historical disadvantage..
  - Apartheid legacy on curriculum, poor learning conditions, under-resourced schools with large class sizes, fewer STEM teachers.
- World Economic Forum (WEF, 2012)
  - South Africa = Health and primary education 132nd.
- Highest GINI index in world! - Inequality
- Across 54 countries in Africa, the World Bank reports that only an estimated 20% of children aged between three and six are able to access adequate early learning facilities
- Other challenges: lack of diverse representation in learning material, outdated material, COVID lockdowns.
- Starting early is key for future education!





# What can we do?

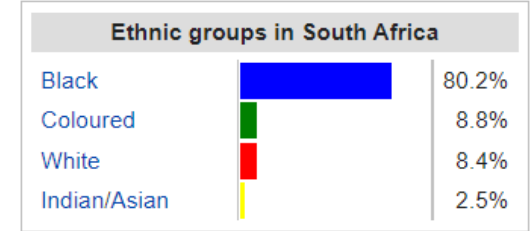
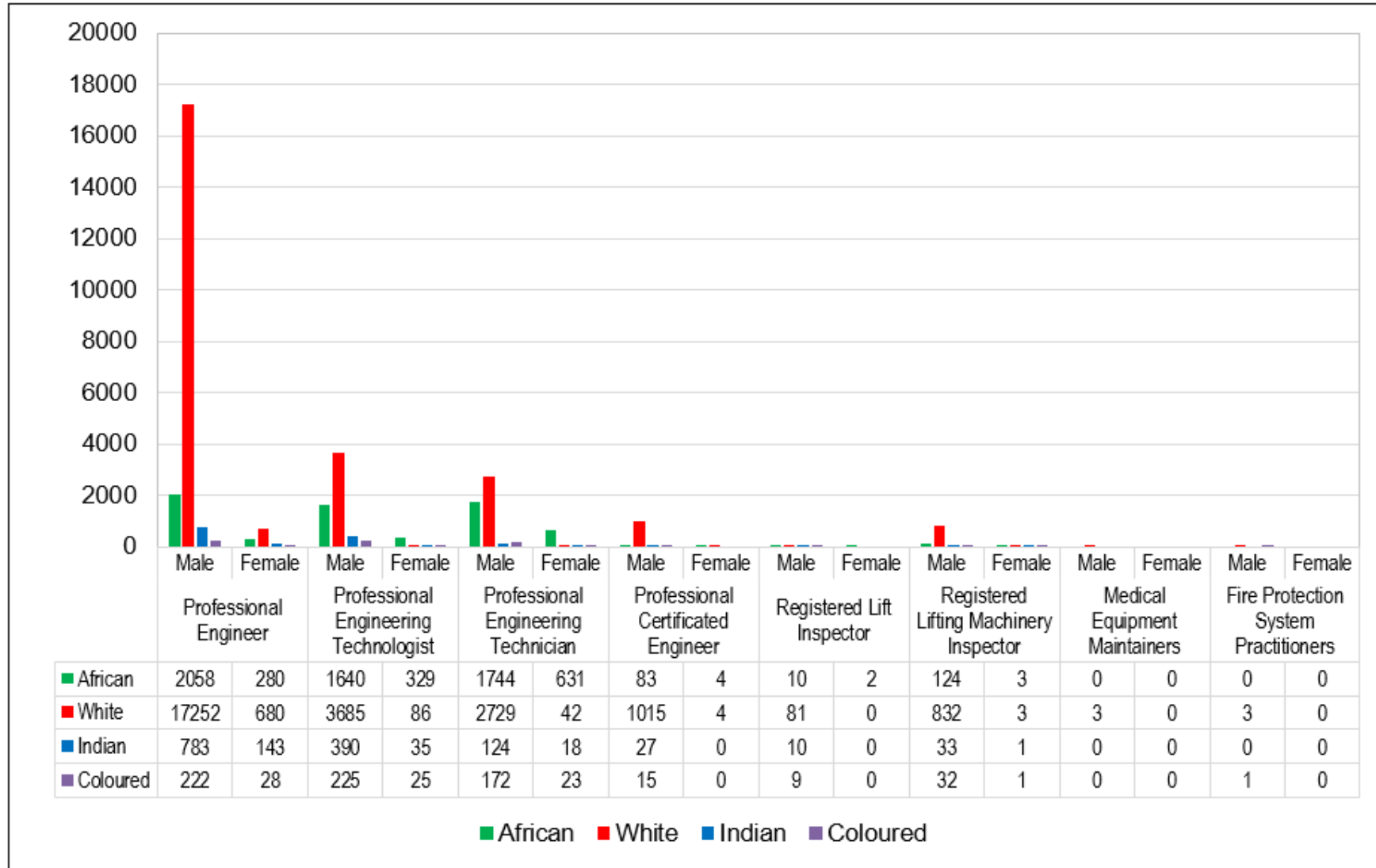
- Government policy – mostly out of our control
- CESA JSI day/SAICE bridge building
- Companies - Donate resources
- Create digital/social media content – learn outside of school
- **Culture Shift:** Make engineering interesting, local and relevant.
- Start in your community, mentoring. Your family
- Invest in education start-ups, disruption
- STEM is not for everyone but everyone can benefit
- **Exponential growth= one person changes many others**
- **WORK TOGETHER!**



# Working and Training to PrEng

- High unemployment
- Exploited graduates
- Graduates with a lot of responsibility and not much support
- New generation and digital graduates
- Not enough technical knowledge being passed on, missing middle

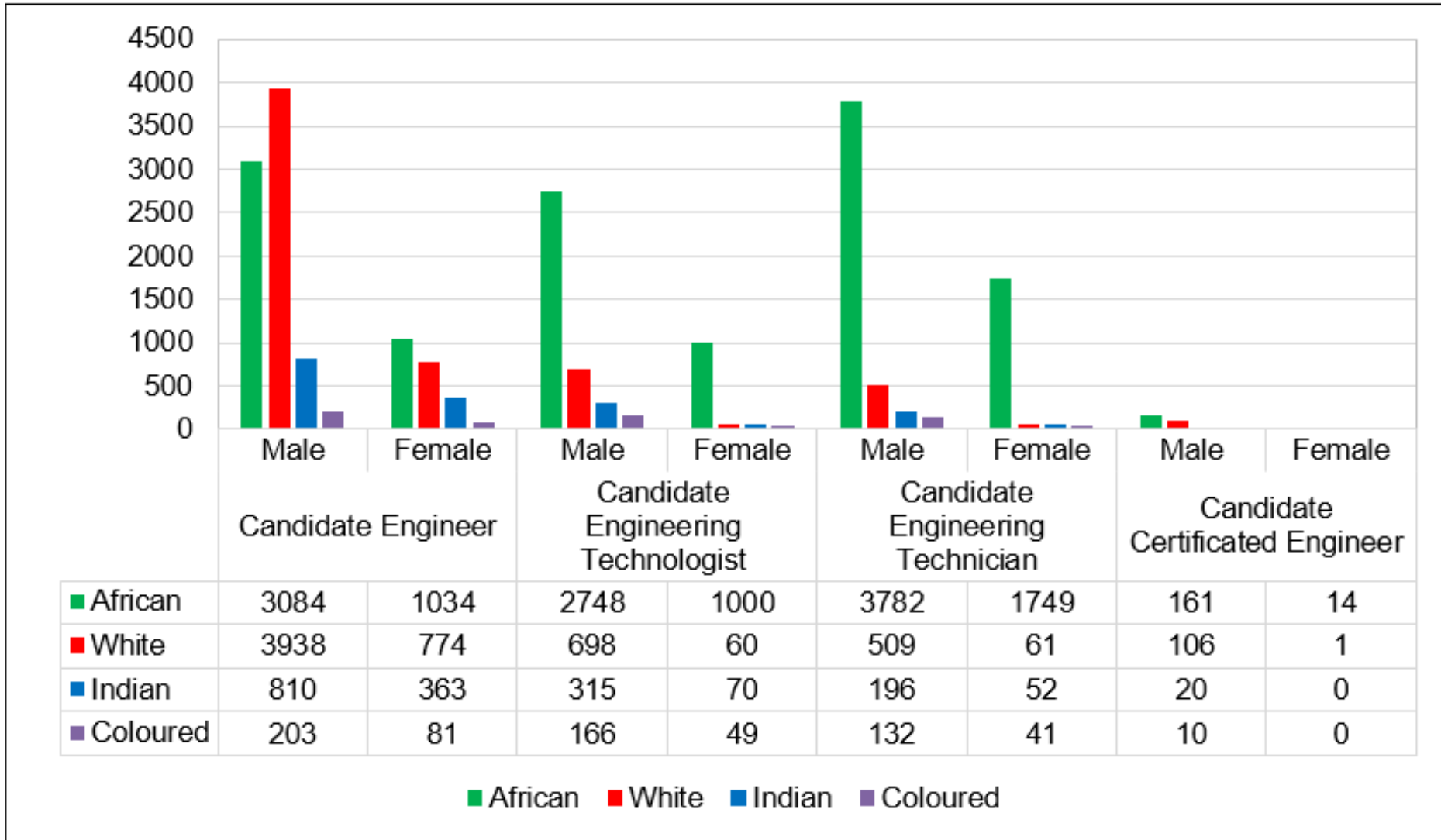
# Professional Registration



Male	Female	Total
25,188,791	26,581,769	51,770,560

Source: ECSA Report  
2018/19

# Candidates



Is change happening on a management level?

Is change happening fast enough??

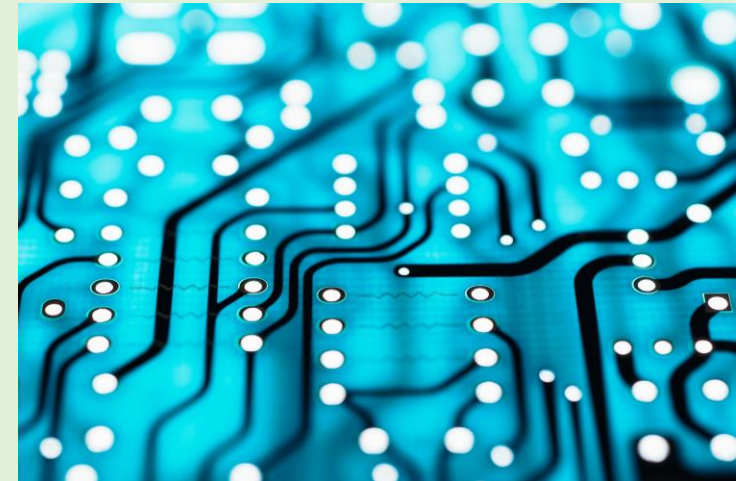
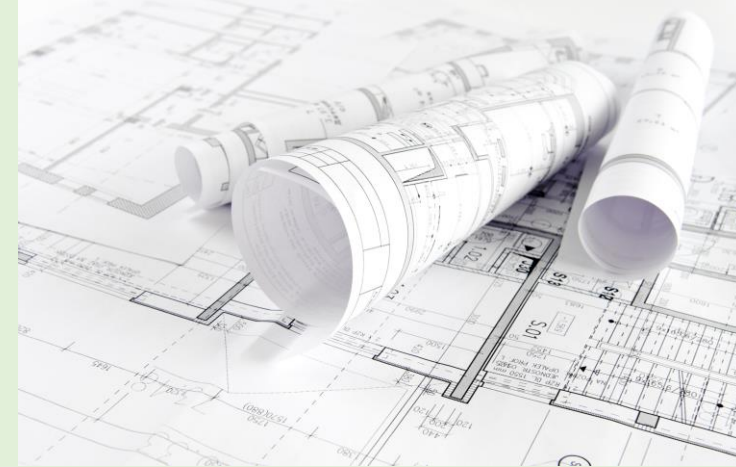
What about Female Professionals?

Source: ECSCA Fourth

Quarter Report 2018/19

# What can we do?

- Government/Entrepreneurs - Reduce youth unemployment
- Public-private partnerships
- **Culture Shift:** Company culture which supports diversity
- Structured training programmes leading to PrEng
- Building of holistic engineers
- Engineering methods which support diversity, “de-colonise” engineering
- Formal and informal training
- Mentoring and skills building
- Support and community





# Engineering Pipeline



Source: CBE Report 2019

# REFERENCES:

- <https://blogs.worldbank.org/africacan/lets-accelerate-women-stem-agenda-today-tomorrow-will-be-too-late>>
- <https://createdigital.org.au/fixing-stems-leaky-pipeline-requires-cultural-change/>
- <https://acola.org/wp-content/uploads/2018/12/Consultant-Report-South-Africa.pdf>
- <https://mg.co.za/education/2021-03-08-dont-squander-the-stem-switch-on/>
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- [https://en.wikipedia.org/wiki/Demographics\\_of\\_South\\_Africa#Age\\_and\\_sex\\_distribution](https://en.wikipedia.org/wiki/Demographics_of_South_Africa#Age_and_sex_distribution)

# Disruptive education resources:

1. [Scifest Africa](#): A project combining two components: The National Science Festival (which is held in Grahamstown, Eastern Cape, every March) and regional and national outreach programmes (which take place all over South Africa throughout the rest of the year). Check out their website for unique interactive events and educational resources.
2. [Afrika Tikkun](#): A non-profit organisation that promotes STEM education from early childhood (Cradle to Career 360 model) through to youth and career development programmes. Afrika Tikkun provides training in coding, web design, network security and computer literacy. With support from their partners, Afrika Tikkun can provide equipment too: computer labs, with high-speed internet.
3. [Iamthecode](#): A movement designed to get governments, business and investors to support young women in STEM, through learning how to code, creative learning and cracking problems. Iamthecode aims to empower 1 million young women and girls globally to become coders by 2030.
4. [Rethink](#): An e-learning platform, which allows students to access high quality materials wherever their geographical location.
5. [South African Women in Science and Engineering](#): A dynamic association that aims to strengthen the role of women in science and engineering in South Africa. They do this by raising the profile of female STEM workers, providing role models, funding scholarships and lobbying for the advancement of South African women in STEM.
6. [Techwomen](#): A mentorship and exchange programme that aims to empower, connect and support the next generation of women leaders in STEM from Africa, Central and South Asia, and the Middle East.