

But girls just don't like tech

Shirley de Wit

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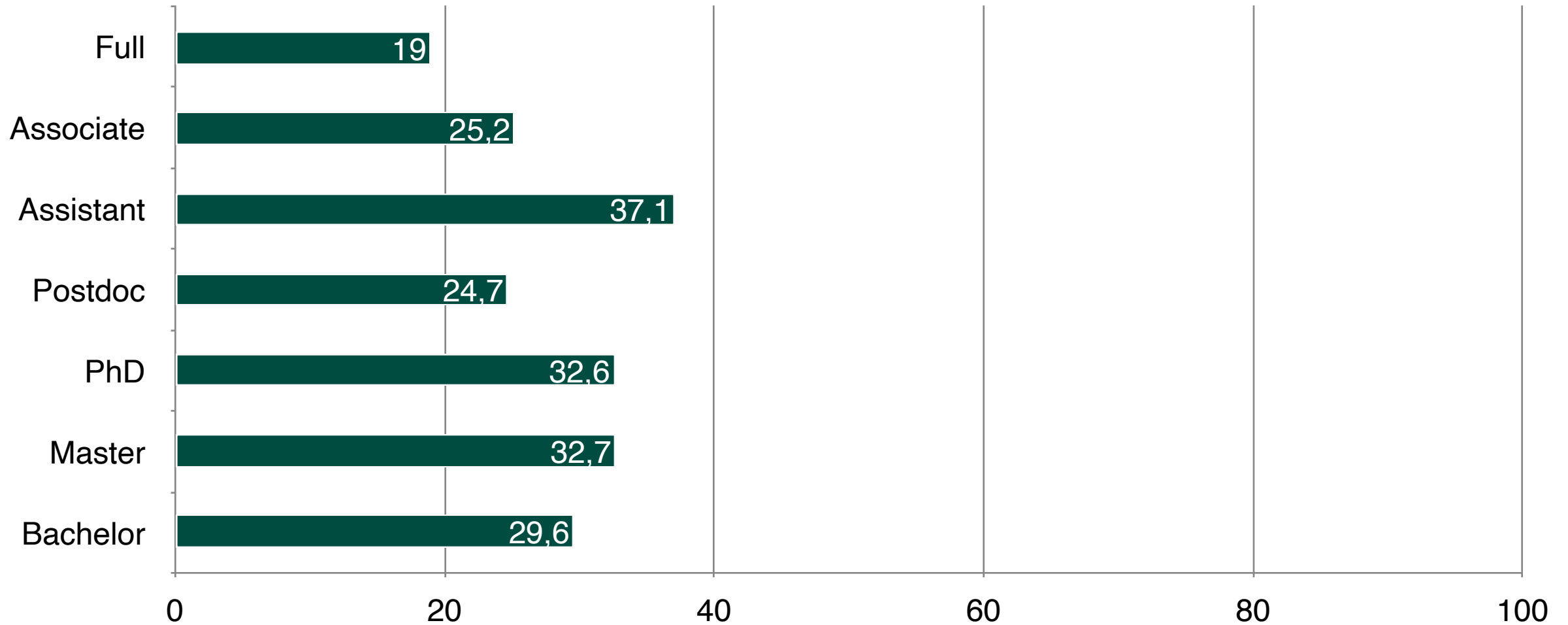


Why should we
care about
gender diversity
in STEM?

Why do we have
fewer women in
STEM?

What can we do
to attract and
retain women in
STEM?

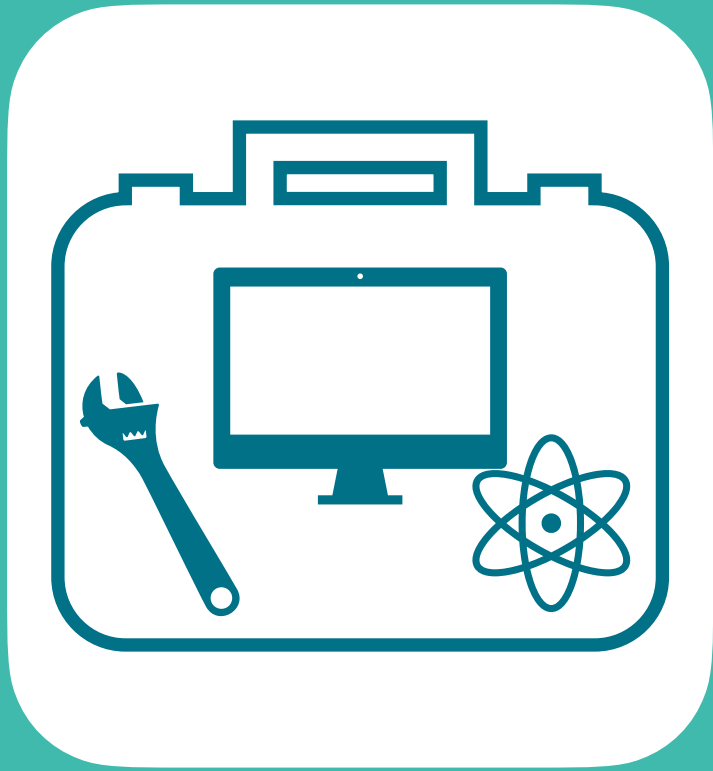
Percentages of women at TU Delft: students and scientific staff



Where do employees with a technical background work?

1 out of 5 women work in tech

1 out of 2 men work in tech

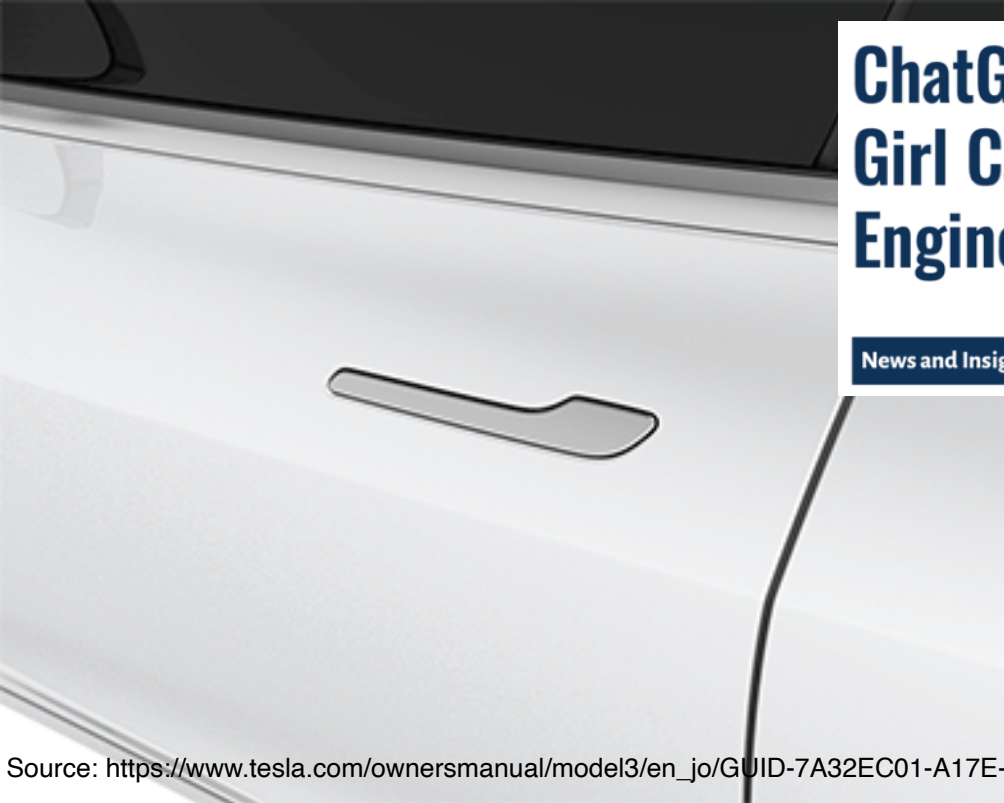


Apple's New Health Tracking App Forgets That Periods Exist

By Erin Gloria Ryan Published September 26, 2014 | Comments (144)



Source: <https://jezebel.com/apples-new-health-tracking-app-forgets-that-periods-exi-1639493214>



ChatGPT-4 Reinforces Sexist Stereotypes By Stating A Girl Cannot “Handle Technicalities And Numbers” In Engineering

News and Insights March 23, 2023



Source: https://www.equalitynow.org/news_and_insights/chatgpt-4-reinforces-sexist-stereotypes/

Source: https://www.tesla.com/ownersmanual/model3/en_jo/GUID-7A32EC01-A17E-42CC-A15B-2E0A39FD07AB.html

But girls just don't like tech by Shirley de Wit (2024)



Why do we have fewer women in STEM fields?

Image: Angelina Bambina/Shutterstock

Gender
stereotypes

Stereotypes
about STEM

Self-efficacy
and mindset

Interest
development

Gender
stereotypes

Stereotypes
about STEM

Self-efficacy
and mindset

Interest
development

< Alle

Afbeeldingen

Nieuws

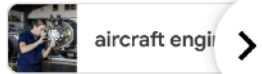
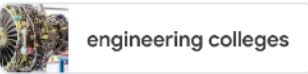
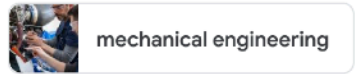
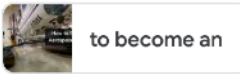
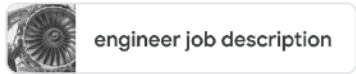
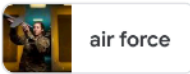
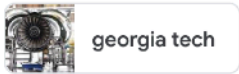
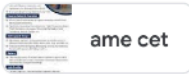
Video's

Boeken

: Meer

Tools

SafeSearch



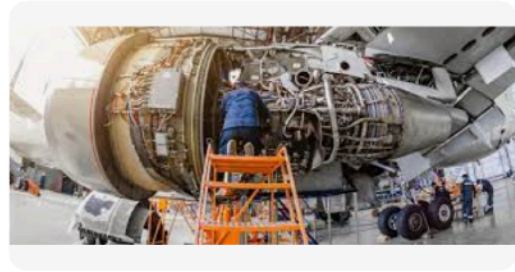
THE Times Higher Education (THE) What can you do with an aerospace e...



The Guardian University subject profile: aerospace en...



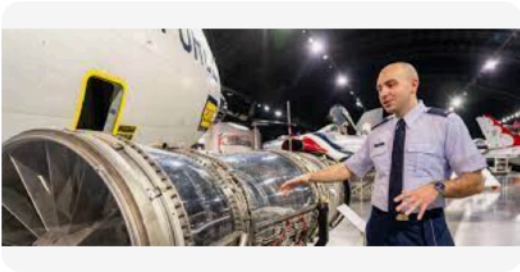
University of Central Florida Aerospace Engineering Job Outlook in...



FAMU-FSU College of Engineering - Florida State Univer... All you wanted to know about aerospace engineeri...



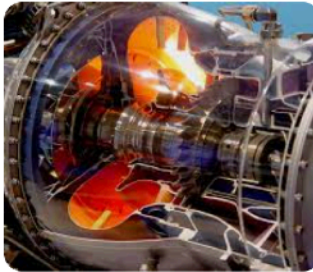
TryEngineering Do You Want To Be An Aerospace En...



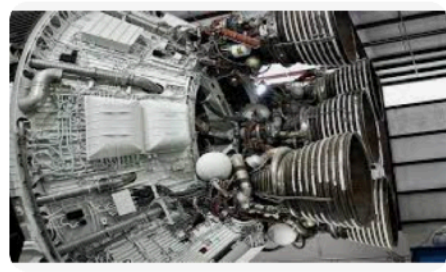
Western Michigan University Aerospace Engineering (B.S. in Engineering) | Mech...



BC Scholarships B.C. Scholarships - How to Becom...



Live Science What Is Aerospace Engineerin...



iDreamCareer Aerospace Engineers Hew Space Transpor...

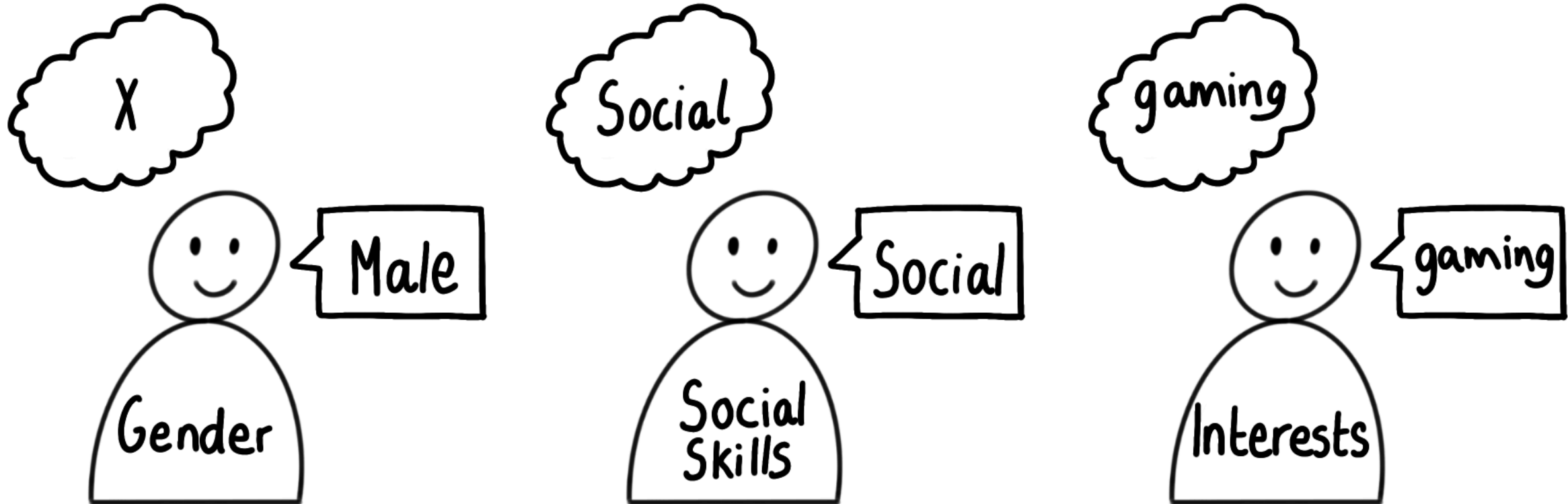


YouTube What is Aerospace Engineering? - YouTube



Children's Implicit and Explicit Stereotypes on the Gender, Social Skills, and Interests of a Computer Scientist

de Wit, Hermans and Aivaloglou



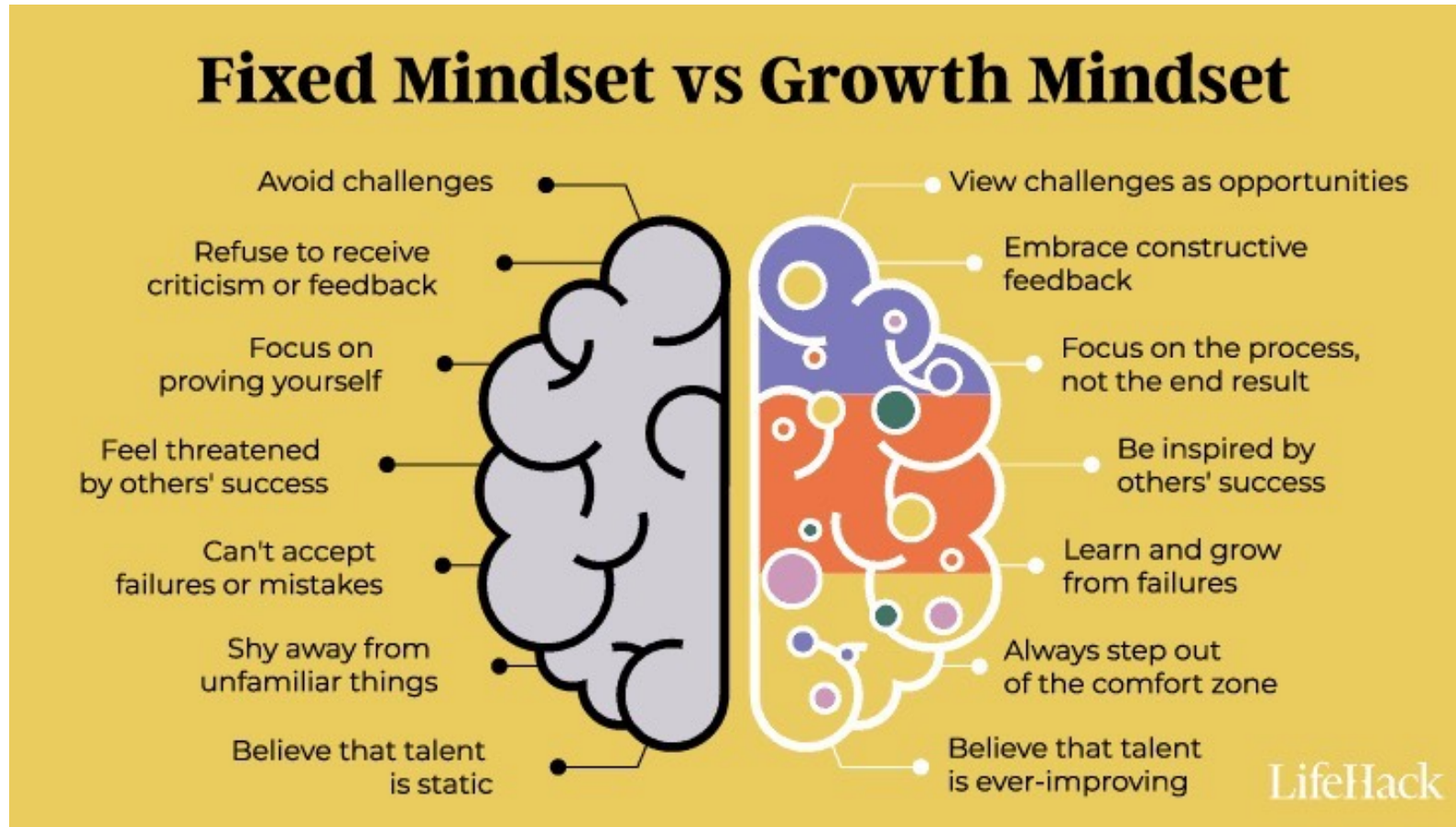
Funded by VSNU Digital Society and COMMIT/

Gender, Social Interactions and Interests of Characters Illustrated in Scratch and Python Programming Books for Children

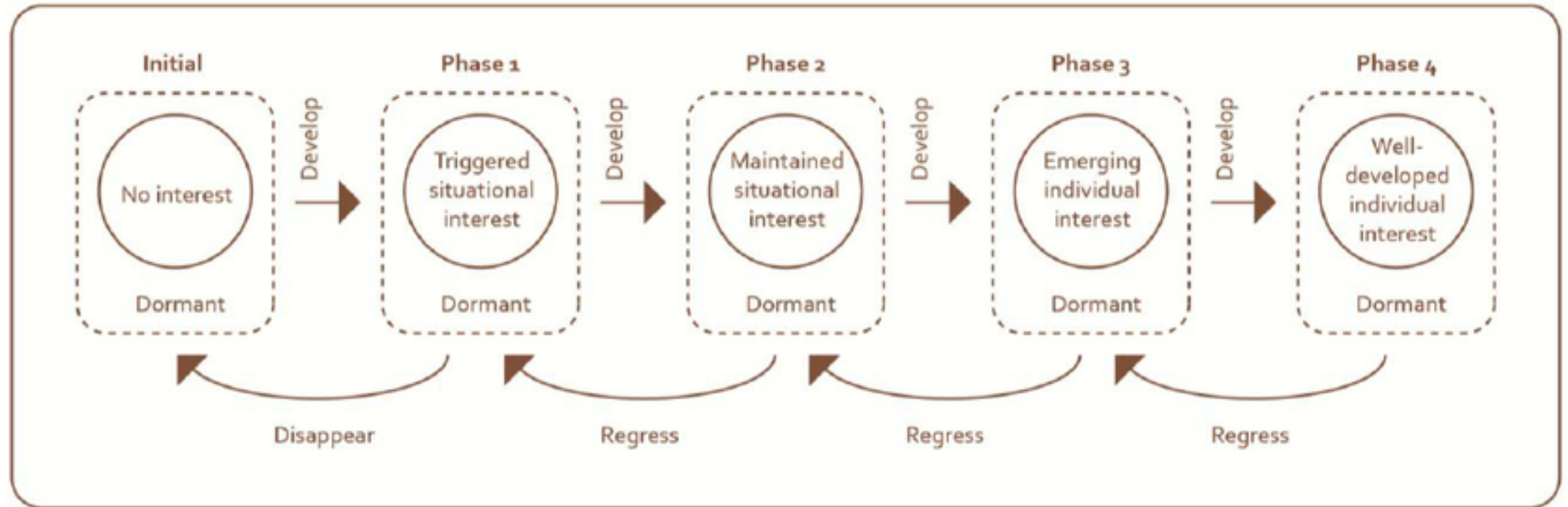
Shirley de Wit, Felienne Hermans, Marcus Specht, Efthimia Aivaloglou
Delft University of Technology & Vrije Universiteit Amsterdam

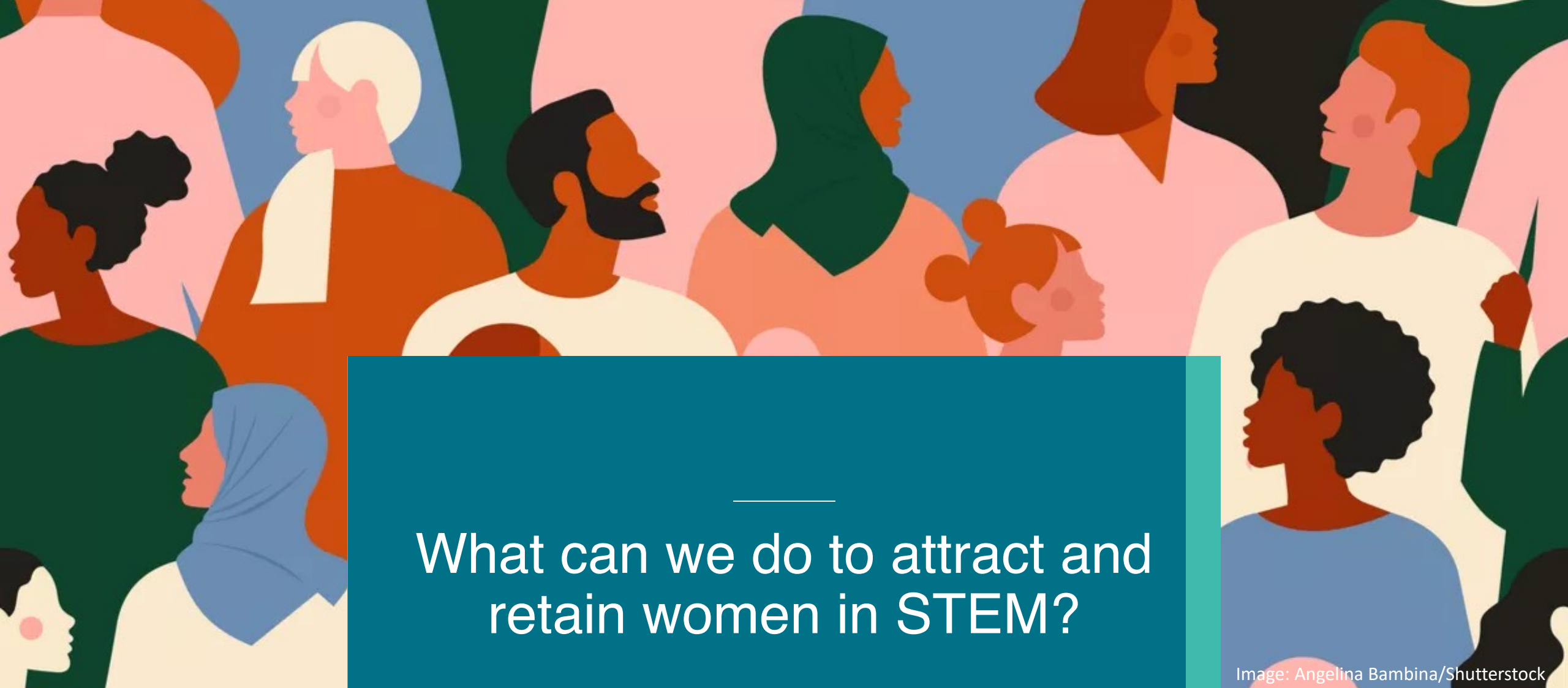


Self-efficacy and mindset



Interest development

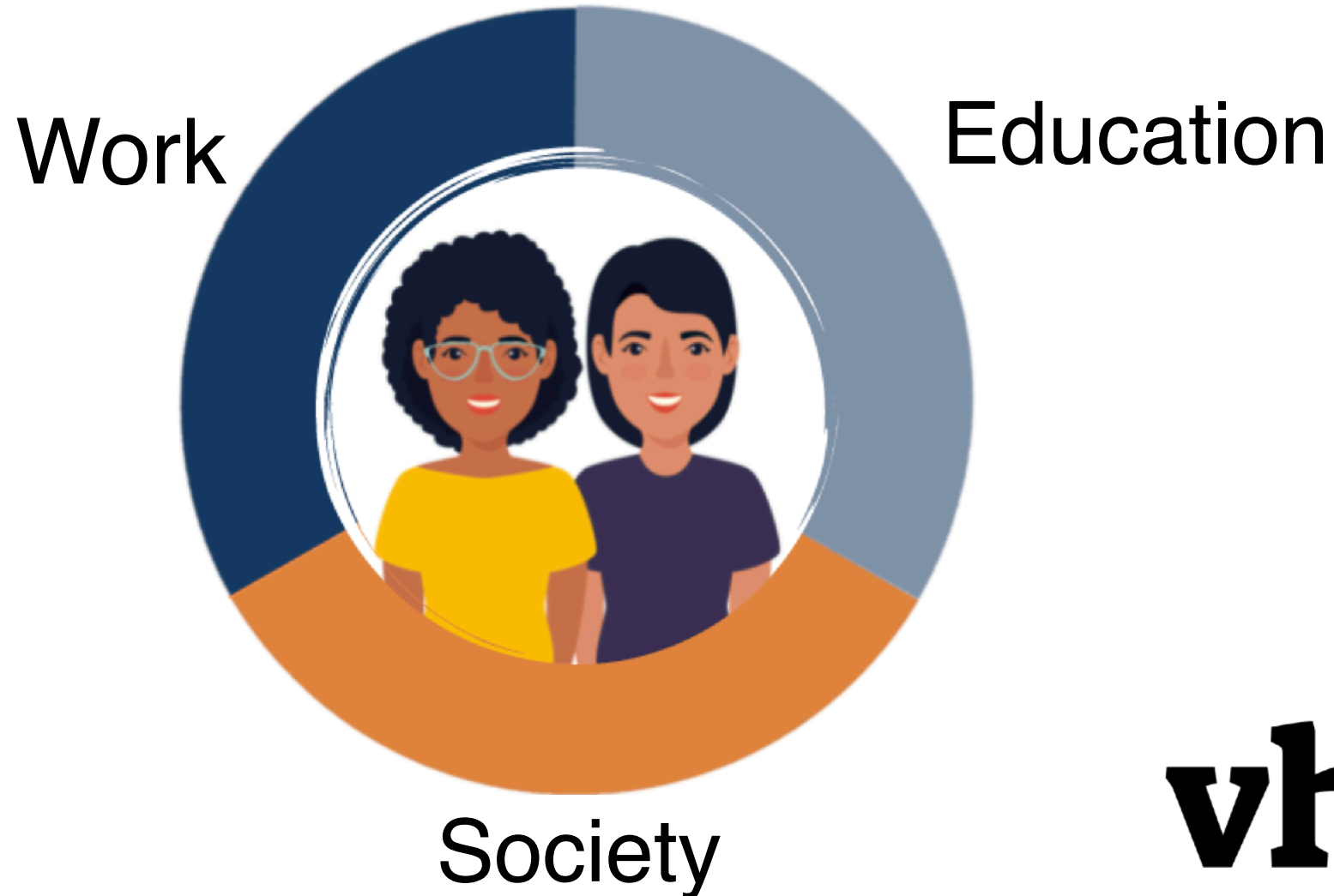




What can we do to attract and retain women in STEM?

Image: Angelina Bambina/Shutterstock

Don't fix the girls, fix the system



Inclusive
research

Role models

Inclusive
education

Inclusive research

- Diverse team of researchers
- Discuss how your research could impact people
- Ask feedback from a diverse group of people outside of your team
- Make women the default, for instance when using personas
- Recruiting participants: context, language and visuals
- Recruiting participants: different channels to find people outside of your own network
- Asking for gender: which of the following best describes you, how do you identify
- Asking for gender: provide options or make it an open question, always the option to not share



Inclusive research

- Be aware of your own biases and don't make assumptions
 - Example: Likert questions 'Is programming a job for girls?' versus 'Is programming more for girls or boys'
- Be aware of the biases of your participants
 - Example: 'Girls have long hair'
- Writing: include diversity aspects in your participant section
- Writing: include your own diversity aspects (e.g. data collection)
- Analysis: are there gender difference?
- Discussion and limitations: reflect on the (lack of) diversity in your research



Role models

- You are a role model, independent of your gender!
- Interactions with pre-university students (e.g. on schools or open days)
- Media presence: press releases, awards, experts on news topics
- Peers



Inclusive education

Table 2 Names of famous people listed in textbooks LC, OCR, CfE1, and CfE2

LC (In this curriculum, the syllabus specifies names to be known, and these are included in bold)

Names of Men:

Svante Arrhenius, Francis Aston, **Amadeo Avogadro**, Johann Jakob Balmer, **Henri Becquerel**, **Niels Bohr**, **Robert Boyle**, **Johannes Brønsted**, Robert Brown, Henry Cavendish, Anders Celcius, **James Chadwick**, **Jacques Charles**, **William Crookes**, **Pierre Curie**, **John Dalton**, **Humphry Davy**, Louis de Broglie, **Democritus**, **Johann Wolfgang Döbereiner**, Michael Faraday, Luigi Galvani, Joseph Gay-Lussac, Fritz Haber, **Werner Heisenberg**, Germain Hess, Felix Hofmann, Friedrich Hund, Antoine Lavoisier, **Henri Le Chatelier**, Fritz London, **Thomas Lowry**, **Dimitri Mendeleev**, **Robert Millikan**, **Henry Moseley**, **John Newlands**, Wolfgang Pauli, Linus Pauling, **Ernest Rutherford**, Erwin Schrödinger, Soren Sørensen, **George Stoney**, **J. J. Thomson**, William Thomson (Lord Kelvin), Mikhail Tswet, **Johannes van der Waals**, Alessandro Volta, Lajos Winkler

Names of Women:

Marie Curie

OCR

Names of Men:

Dmitri Mendeleev

Names of Women:

None

CfE1

Names of Men:

Svante Arrhenius, Heston Blumenthal, Hennig Brand, Richard Buckminster Fuller, Dmitri Mendeleev, John Newlands, Linus Pauling, James Young

Names of Women:

None

CfE2

Names of Men:

Kofi Annan, Richard Axel, Heston Blumenthal, Robert Boyle, Lawrence Bragg, William Bragg, Julius Caesar, Yves Chauvin, Robert Corey, Paul Crutzen, Robert Curl, John Dalton, Johann Wolfgang Döbereiner, François Englert, Georgy N. Flyorov, René-Maurice Gattefossé, Andre Geim, Robert Grubbs, Peter Higgs, David Hockney, Martin Karplus, Harry Kroto, Nicholas Kurti, Ernest Lawrence, Michael Levitt, Nicolas LeBlanc, Henri Le Chatelier, Dmitri Mendeleev, Mario Molina, Henry Moseley, John Newlands, Barack Obama, Linus Pauling, Jackson Pollock, Sherwood Rowland, Frederick Sanger, Richard Schrock, William Sheppard, Richard Smalley, Hervé This, Mikhail Tswet, Tutankhamun, Max von Laue, Jean Valnet, Xi Jinping, John Warner, Arieh Warshel

Names of Women:

Linda Buck, Dorothy Hodgkin, Latezia Stanghellini

Inclusive education

- Diverse role models in materials
- Stereotypes in materials (beyond representation)
 - Mathematics books: women calculate their weight gain and men compare their sport results
 - Mathematics books: women insecure about their answers and men enjoy math
- Value of topic (in society)
- Context that many enjoy or can relate to e.g. music
- D&I in your assignments: model the human in a database model
- Assignments with people not with things

Inclusive education

- There are more female than male characters
- Only 25% of positive characters is female
- 13% of female characters are 'good'
- 50% of male characters are 'good'

Table 1: Summary of the cryptographic protocol characters, showing their gender and the connotation of their role (Key: (F) Female; (M) Male; (Mix) Both; (+) positive connotation; (-) negative connotation; (/) No associable connotation).

Name	Alice/ Bob	Carol	Chuck	Craig	David	Erin	Eve	Fayth	Frank	Grace	Heidi	Mallory	Oscar	Peggy/ Victor	Plod	Sybil	Trent	Trudy	Walter	Wendy
Gender	Mix	F	M	M	M	F	F	F	M	F	F	F	M	Mix	M	F	M	F	M	F
Connotation	/	/	-	-	/	/	-	+	/	-	-	-	-	/	+	-	+	-	+	-

Inclusive education

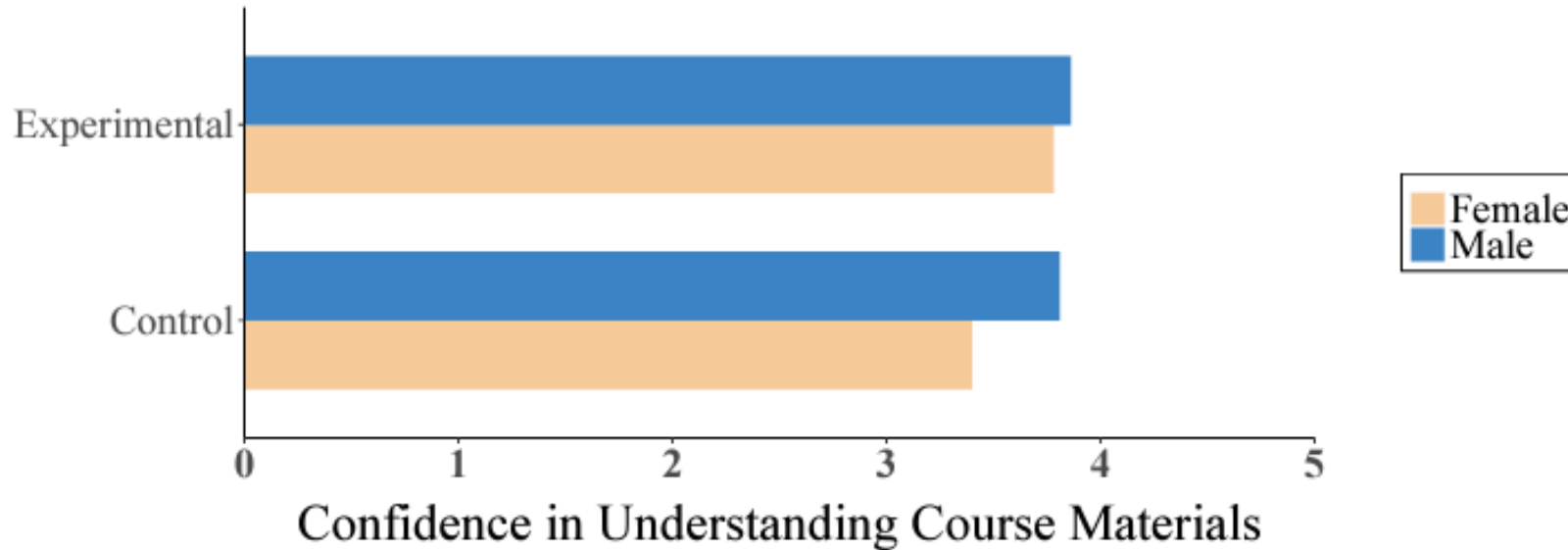


Figure 1: Student confidence ratings for traditional (control) and equitable approaches (experimental).

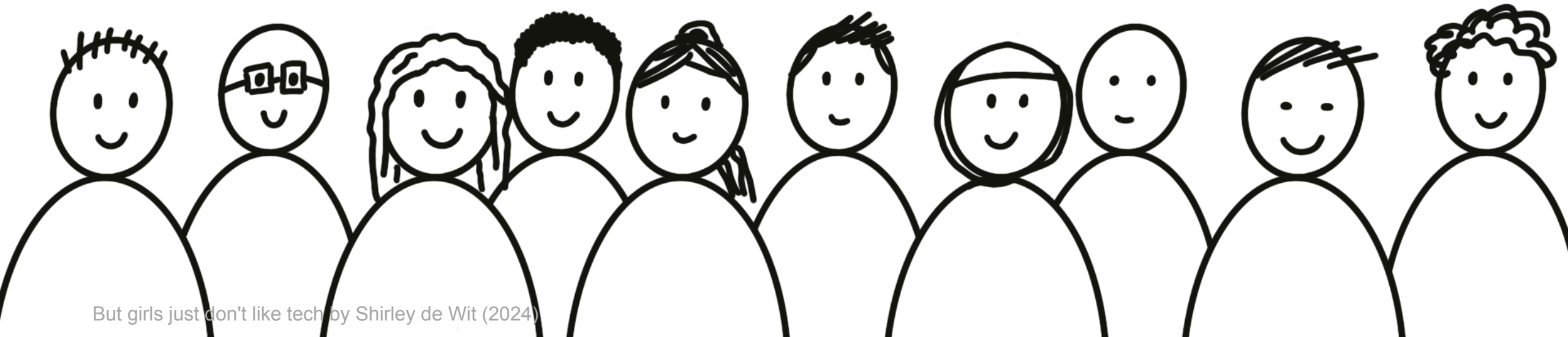
Towards Open Inclusive STEM Education

Shirley de Wit, Jorge Martinez Castaneda, Sanne Alblas, Efthimia Aivaloglou,
Hanno van Keulen, Ajay Jagadeesh, Anandini Jayanthi, Isabelle El-Hajj

Open-source
resources on inclusive
STEM Education

Domain-specific
Examples of Inclusive
STEM Education

Training Sessions on
Open Inclusive STEM
Education



Resources if you want to know more

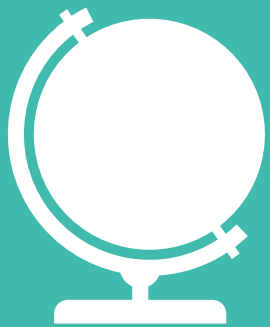
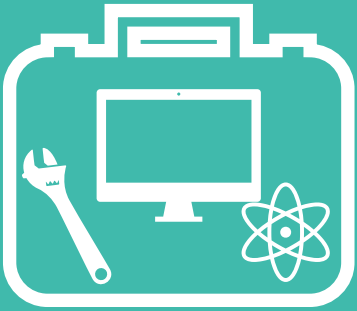
- Monitor techniekpact with numbers on tech education and labor market in the Netherlands: <https://www.techniekpact.nl/monitor/techniekpact>
- Numbers on ICT education and labor market in the Netherlands: <https://pr-edict.nl/>
- Video ‘Mannenwereld’ at De Avondshow: <https://www.youtube.com/watch?v=IFA9Z6R0ITY>
- Scientific article *Hofstra et al. (2020) The Diversity–Innovation Paradox in Science* <https://www.pnas.org/doi/abs/10.1073/pnas.1915378117>
- Scientific article *Jaccheri et al. (2020) Gender Issues in Computer Science: Lessons Learnt and Reflections for the Future*, https://ieeexplore.ieee.org/abstract/document/9357077?casa_token=D0Ka3ilKUaUAAAAA:mlvBaWQ0rgKHO0H5KQa3m5dqM9I7dmiNjH7HR4PF0pF4jeXGFpnmfxIMJR7FaRfSa1xi89G1
- GenderMag, tool for helping with gender inclusive software: <https://gendermag.org/>
- Events celebrating women in STEM, e.g. for computing: Alice and Eve: <https://alice-and-eve.github.io/2023/>
- Podcast ‘Beeldenbreken in Tech’ (intro in Dutch, but interviews in English): <https://app.springcast.fm/podcast/beeldenbreken-in-tech>
- Becoming a role model at VHTO <https://www.vhto.nl/aanbod/spiegelbeeld/>
- Article on interest development: Judith M Harackiewicz, Jessi L Smith, and Stacy J Priniski. “Interest matters: The importance of promoting interest in education”. In: *Policy insights from the behavioral and brain sciences* 3.2 (2016), pp. 220–227

Resources if you want to know more

- Video gender and toys <https://youtube.com/watch?v=nWu44AqF0il>
- Article: Ellemers, N. (2018). Gender stereotypes: <https://www.annualreviews.org/doi/abs/10.1146/annurev-psych-122216-011719>
- Article on bias in search results (google images)
- Article: Hidi & Renninger (2010) The four-phase model of interest development https://www.tandfonline.com/doi/abs/10.1207/s15326985ep4102_4?casa_token=0pyGTKikUlcAAAAA:MRzs09UVDZ_KYNdeXCqqPWh9H4yThGR5wcW6GIAY4F4yxxdUZFAGot5hkTFNAwNENLrYZeE7msXa
- Awareness of own implicit stereotypes: <https://implicit.harvard.edu/implicit/takeatest.html>
- Report of VHTO about gendered advice on high schools (in Dutch): <https://www.vhto.nl/vrijvoorsorterenoplater/>



Importance



Reasons

Gender roles

Stereotypes
about ICT

Self-efficacy
and mindset

Interest
development

Actions

Society

Work

Education

Inclusive research

Role models

Inclusive education

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