

**"I am no longer accepting the things I
cannot change. I am changing the things I
cannot accept."**

- Angela Davis



2021 SURVEY

of female students' attitudes to STEM

**CHOICES
CHANCES
CHANGES**





A message from the I Wish Team

Welcome to the 2021 I Wish Survey Results. This year, **2449 teenage girls responded to our survey on their attitudes towards STEM**, the largest survey of its kind in Ireland.

In March of this year, we held the **first I Wish virtual showcase event**, a significant pivot from our annual four-day live event. But, like everyone, we adapted because we knew I Wish was important to the thousands of young women that attend every year, and our wonderful audience adapted with us, growing by over 9,000 from the previous year.

Impact of the global pandemic

While the global pandemic has fast-forwarded many of us into the digital future, it has also highlighted the **vulnerability of women in the workplace**. Women were disproportionately affected by the pandemic; The Global Gender Gap 2021 Report confirmed that **closing the gender gap has increased by a generation**, from 99.5 years to 135.6 years, as a result of the impact of Covid 19. In Ireland, Ibec research published in April 2021 confirmed that Covid 19 accentuated gender imbalances across several dimensions and threatened hard-won markers of gender equity.

Why STEM participation matters

Now, more than ever, it is imperative that we help girls recognise their potential in STEM. Of the 20 fastest growing careers in the world, 15 of them require a background in maths or science, **yet only 25% of the STEM workforce in Ireland is female**.

Through our 2021 Survey we discovered that, while the girls understand that STEM represents the future, they **still crave exposure to female STEM role models, mentorship programmes, and more information about careers and college courses**. Lack of confidence in their abilities came up again as an obstacle to pursuing a career in STEM. We also identified a concerning absence of STEM subject choices in single sex girls' schools in particular. We cannot tolerate an education system that allows gender divides and bias.

How I Wish can help

At I Wish, we are playing our part by continuing to showcase female role models in STEM and have broadened our scope to a year-round suite of activities, designed to engage with the girls at key touch points in their lives.

The confidence gap starts long before girls start making decisions about subject choices. This year we are working on **bringing the I Wish message to pre-teens**, so they can start to rewrite the story of girls in STEM.

To ensure ongoing support for women, and access to a network as they progress, we run **campus events with higher education institutions, internships, externships, and mentorship programmes** supported by some of the biggest names in the tech, science and engineering worlds.

If we invest in girls today, we support the innovators of tomorrow and ensure the next generation is raised by empowered parents.

How you can help

So here is our call to action: get involved, lend your voice, be a mentor, empower, pay it forward. It will make a difference. Today in Ireland there is a 13-year-old girl, full of ability, who does not feel confident enough to choose STEM. She needs you, and for a more diverse and equal society, we all need you.

A promise to ensure *"no one is left behind"* was made by governments across the world as part of their commitment to the UN Sustainable Development Goals. At I Wish we promise to build on OUR commitment to ensure that no girl gets left behind.

What will you do?

✓
The I Wish Team

#Nogirlgetsleftbehind



WHY ARE WOMEN STILL UNDER-REPRESENTED IN STEM?

We can only realistically aspire to careers we know about and understand. The perceptions of I Wish 2021 participants of the **BARRIERS** they face in pursuing a career in STEM overwhelmingly reflect a need for **more information about STEM careers** and **educational paths to those careers**. Additional barriers included **lack of access to STEM role models, mentorship, and work experience**.



Gender bias and stereotypes affect not only how we perceive and treat others, but how we perceive ourselves and the decisions we make for ourselves.

Although **97%** of I Wish respondents rejected the stereotypical belief that STEM is more suited to boys, they are keenly aware of – and deterred by – poor gender equality in STEM.

WHAT BARRIERS TO CAREERS IN STEM DO TEENAGE GIRLS SEE?

WHAT GENDER-SPECIFIC BARRIERS TO CAREERS IN STEM DO TEENAGE GIRLS SEE?

89% not enough STEM work experience or mentorship programmes

88% not enough information about available college courses

87% not enough information about available STEM jobs

85% not enough school visits by role models

83% not enough gender equality in STEM

78% lack of STEM subject choice in their school

77% are not confident in their ability to do STEM

BARRIERS



SUPPORT



GENDERED PERCEPTIONS OF STEM careers are also reflected in students' rating of skills and traits required for success in STEM. Traits such as problem-solving (**84%**), curiosity (**78%**), logic (**78%**) were identified as very/extremely important. However, caring, or helping others, a trait more typically associated with female-dominated professions, was identified as very/extremely important by only **35%** of respondents. Research shows that girls are gravitating towards "caring" professions, and that is wonderful, but STEM and caring co-exist!

WHAT CAN WE DO TO RAISE AWARENESS AMONGST TEENAGE GIRLS OF THE VITAL ROLES PLAYED BY STEM IN IMPROVING HUMAN LIFE?

A LACK OF STEM SUBJECT CHOICE in school was identified as a **barrier** to STEM careers. Our research shows that **55%** of our respondents who are interested in studying engineering to Leaving Cert do not have access to it as a subject choice. Similarly for Construction Studies at **52%** and Design and Communication graphics at **46%**. We believe that equal access is important, and there is an inherent bias in not permitting girls access to certain subjects which are more commonly available to boys.

Furthermore, even where boys and girls have equal access to Senior Cycle STEM subjects, girls may be less likely to choose them (Ertl et al., 2017), suggesting that STEM interest levels and gendered preconceptions have been established before Leaving Cert subject choices are made.

WHAT CAN WE DO TO ENSURE THAT STEM SUBJECT CHOICES MORE COMMONLY AVAILABLE TO BOYS ARE EQUALLY AVAILABLE TO GIRLS?

Of I Wish 2021 survey participants, **77%** report a lack of confidence in their ability in STEM subjects. This same **LACK OF CONFIDENCE** is echoed world-wide, where girls are more likely than boys to express a lack of confidence in their ability in STEM subjects, which results in reduced numbers of female applicants to third-level programmes in Engineering, Technology and Mathematics (Ertl et al., 2017; Zander et al., 2020). However, the PISA 2018 study showed no statistically significant gender-based difference in the performance of Irish teenagers in either mathematics or science (McKeown et al., 2019). So, despite evidence that girls and boys are equally able in STEM subjects, girls are not participating at the same rate.

HOW CAN WE SUPPORT GIRLS IN RECOGNISING THEIR EQUAL POTENTIAL FOR ACHIEVEMENT IN STEM SUBJECTS?



CHOOSING-OR NOT CHOOSING-STEM SUBJECTS

The flexibility of the Irish further and higher education system means that even students who have not taken either a Leaving Certificate Science subject or Higher-Level Maths can find an alternative path to a career in STEM. However, students who do not take Leaving Certificate STEM subjects are less likely to consider or pursue STEM careers.

Between 2016 and 2019, just under half (**48%**) of students taking Higher Level Leaving Certificate Maths were female. In 2021 this has risen to 50% (*State Examinations Commission, 2021*).
By comparison, in the UK only **22%** of 2019 A-level Mathematics students were female (*Behavioural Insights Team, DES, 2020*). In Mathematics, Irish girls are **'holding their own'**!

***** With the exception of Biology and Chemistry, female students are under-represented in other STEM subjects, particularly in engineering and technology-based subjects.

Leaving Certificate 2021: % of students taking higher level subjects who are female:

- 63%** biology
- 60%** chemistry
- 44%** agricultural science
- 29%** physics
- 28%** applied maths
- 20%** technology
- 16%** design & communication graphics
- 13%** construction studies
- 8%** engineering

2016

2017

2018

2019

2020

2021

I Wish participants planning to take Higher Level Leaving Cert Maths increased from **66%** to **81%** between 2016 to 2021.



CHOOSING- OR NOT CHOOSING- STEM SUBJECTS CONT.

Low female participation rates in technology and engineering-based STEM subjects may reflect limited access to those subjects in all-girls schools and this is a problem to be tackled. However, there are other factors which impact on STEM uptake by female students.

Students and teachers recognise I Wish as an important source of STEM information. But there is a need for earlier provision – to students, parents and teachers – of information on STEM careers and on pathways to those careers.

HOW BEST CAN WE DE-GENDER STEM SUBJECTS AND RAISE FEMALE STUDENTS' CONFIDENCE IN THEIR ABILITIES TO REACH THE SAME (OR GREATER) LEVELS OF ACHIEVEMENT AS THEIR MALE PEERS IN STEM SUBJECTS?

WHAT FACTORS ARE VERY IMPORTANT TO TEEN GIRLS IN CHOOSING LEAVING CERTIFICATE SUBJECTS?

81% subject is enjoyable

75% subject is necessary for my future college course

42% believing I would fit in

...AND WHAT ARE THE IMPLICATIONS FOR CHOOSING STEM SUBJECTS?

83% interesting career

61% would be good at it

WHEN VIEWED IN THE CONTEXT OF LOW FEMALE ENROLMENT IN MANY STEM LEAVING CERT SUBJECTS...

*...by the time they choose their Leaving Cert subjects, girls have already begun to make college course decisions – but I Wish survey responses show that the vast majority believe they do not have enough information about college courses (**88%**) or STEM jobs (**87%**), which leaves them poorly positioned to choose STEM subjects.*

... where students have gendered perceptions about subjects and associated careers, they may feel that they are less likely to fit in.

DO LOW FEMALE PARTICIPATION RATES IN LEAVING CERTIFICATE STEM SUBJECTS REFLECT...

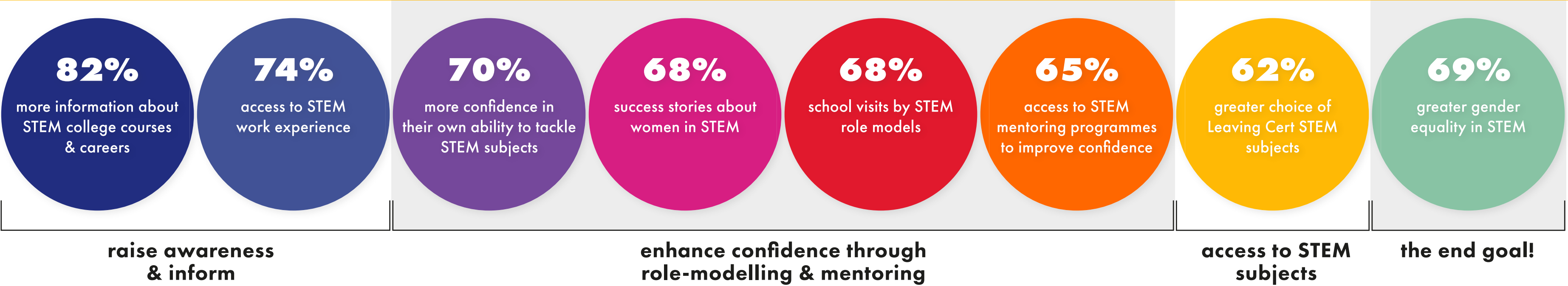
... lack of awareness of STEM-related career opportunities?.

AND/OR

... lack of confidence in personal ability to succeed in STEM subjects, even where there is no evidence to support this belief?.



WHAT DO TEENAGE GIRLS BELIEVE WOULD HELP THEM IN PURSUING A CAREER IN STEM?



PAINTING A PICTURE OF THE STEM-AWARE, SELF-CONFIDENT FEMALE STUDENT

Based on the I Wish 2021 findings, the **STEM-aware female student, who is more confident in her own ability in STEM subjects**, is more likely to have taken Higher Level Junior Certificate Maths and to be considering taking Higher Level Leaving Certificate Maths...

- has a family member or close adult who works in STEM.
- has a female family member or close adult who works in STEM.
- is/has been involved in 2+ hours per week of extra-curricular activities and/or sports, outside of school.

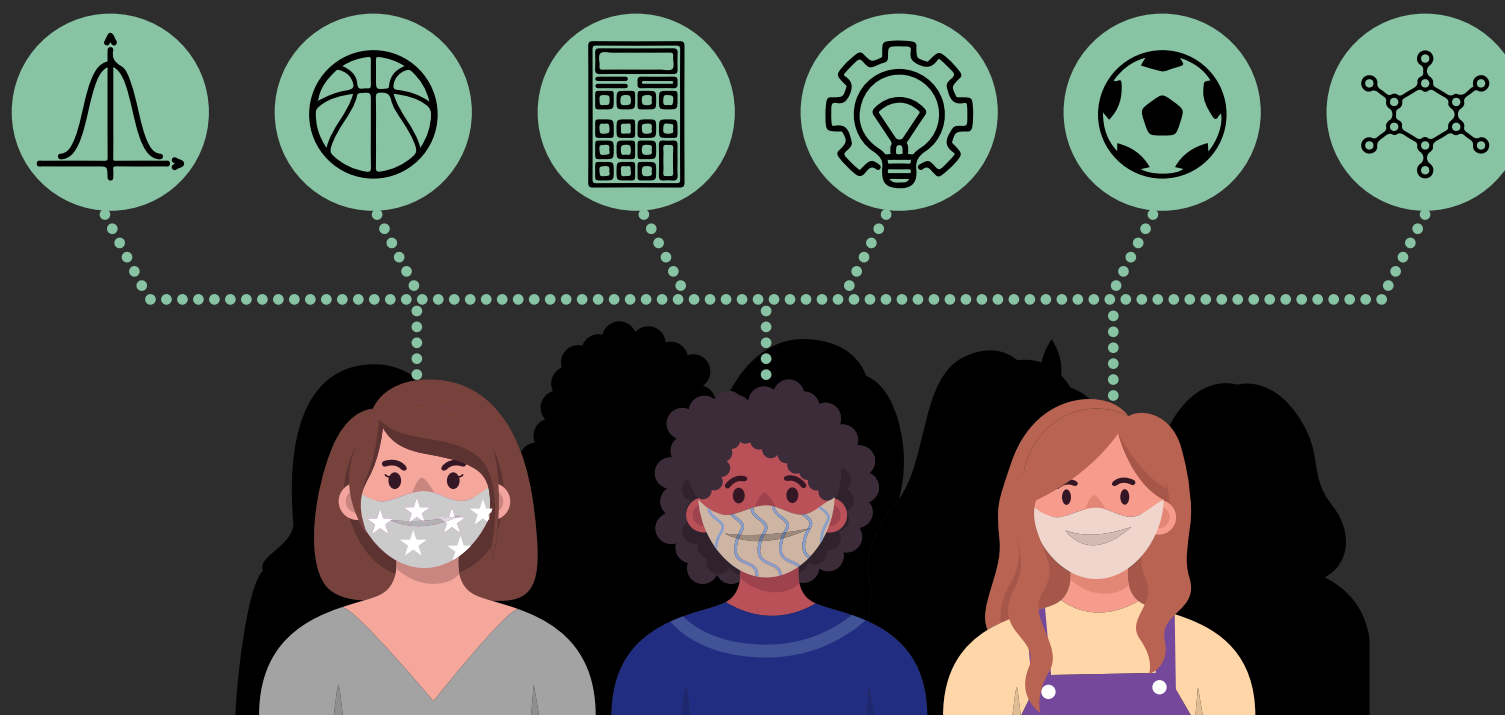
IS THERE A CONNECTION BETWEEN EXTRA-CURRICULAR ACTIVITIES, IN PARTICULAR SPORTS, AND STEM-AWARENESS?

- Does active engagement in sports foster self-confidence in students?
- Does it expand students' networks, increasing their likelihood of meeting STEM role models?
- Does early and sustained engagement in sports dilute gendered perceptions?

I Wish doesn't have the answers to these questions, but they point to very nuanced and interesting trends that merit further research. However, it's noteworthy that **40%** of I Wish 2021 respondents had stopped playing individual or team sports in the last two years (i.e., early in second level), mainly for reasons of time or to focus on their studies.

The health benefits of regular physical activity for teens are well-documented. The I Wish 2021 data suggests that sporting engagement is positively correlated with STEM achievement and self-efficacy in teenager girls, however, their levels of sporting engagement fall dramatically in second level.

HOW CAN WE SUPPORT FEMALE STUDENTS IN REMAINING MEANINGFULLY ENGAGED IN SPORTS THROUGHOUT SECOND LEVEL?



INFLUENCERS & ROLE MODELS

IT'S NOT JUST **WHAT** YOU KNOW!

WHO HAS THE MOST INFLUENCE ON TEENAGE GIRLS IN MAKING LEAVING CERT SUBJECT CHOICES?



teachers



family



role models



peers

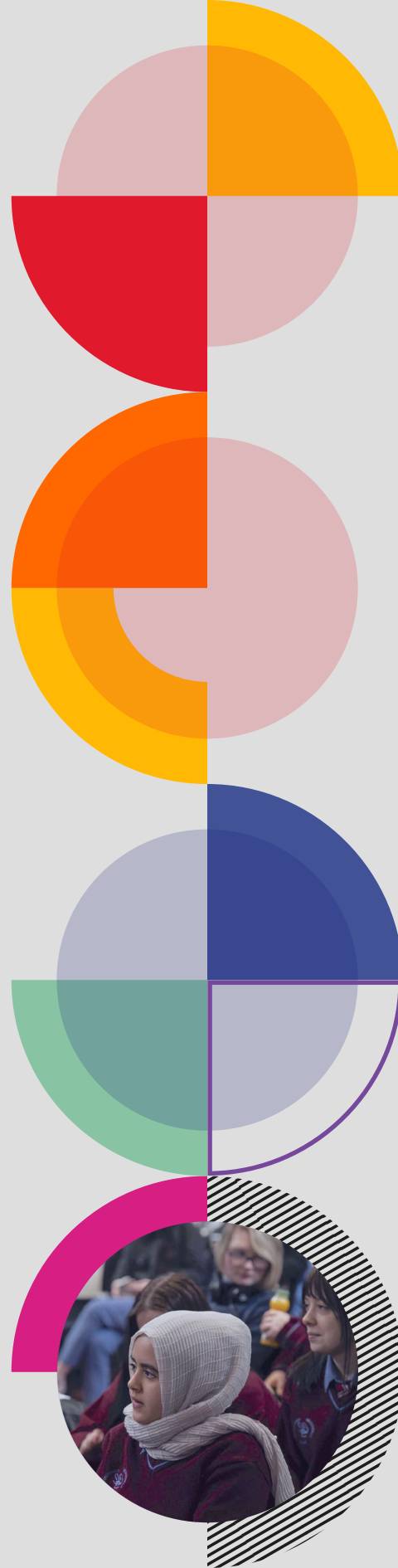


other (friend or family/person at sports club)

Echoing I Wish surveys 2016-2019, teachers, family and role models are the main influencers for female students in their educational and career choices, including choice of Leaving Cert subjects.



I Wish already plays a valuable role in informing teachers about STEM and in providing girls with access to role models.



IS THERE A ROLE FOR THE IRISH STEM COMMUNITY IN SUPPORTING PARENTS AND OTHER INFLUENCING ADULTS IN DEVELOPING THEIR UNDERSTANDING OF STEM CAREERS?

Key Finding: ROLE MODELS MAKE A REAL DIFFERENCE!

Teenage girls who know an adult in STEM are significantly:

- less likely to see **confidence as a barrier** to pursuing a career in STEM.
- less likely to see **access to STEM subjects as a barrier** to pursuing a career in STEM.
- less likely to be deterred by higher **male representation in STEM**.
- more likely to have studied **Higher Level Junior Cert Maths** and to consider studying **Higher Level Leaving Cert Maths**.

From an early age, children begin to view particular careers as more or less suitable for their gender. The sense of **gender stereotyping in STEM** is exacerbated by **lack of access to female role models** with whom students can identify and who represent what they can achieve. **84%** of I Wish 2021 respondents identified the **lack of female role models as a barrier** to pursuing a career in STEM.

Studies show (*González-Pérez et al., 2020*) that female role models and female mentoring interventions increase girls' interest and expectations of success in STEM. I Wish 2021 data supports these findings!

I WISH LOOKS TO THE FUTURE

Studies suggest that lasting impact requires multi-faceted interventions (Luttenberger et al., 2019), at different stages of the educational journey (Archer et al., 2021) and involving not just the female students, but parents (Behavioural Insights Team, UK DES, 2020), role models and mentors. Learning from I Wish findings and from international best practice, I Wish is expanding its offerings:

- **Third level:** I Wish Mentoring Programme, for I Wish alumni now enrolled in third-level STEM programmes, to support these young women in their STEM careers and to foster future I Wish mentors.
- **Senior Cycle:** I Wish Internships, TechForGood, our International Twinning XChange programme, and more profiles of successful women in STEM.
- **Junior Cycle:** aligned I Wish class materials, to support teachers in raising younger students' awareness of the variety and impact of STEM careers.
- **Primary Level:** I Wish classroom visits by 3rd-level female STEM students and young female STEM professionals, to excite pre-teens about STEM, provide female role models and challenge gender-stereotyping.

Increasing female participation in STEM is a stubborn global problem, but we have made significant strides. Ireland now has the second highest level of female participation in STEM in Europe. However, we have a long way to go!

This is a “**whole of society**” issue. We need to continue to work with girls and with their teachers and parents, **to empower girls to think positively about STEM and their role in it.** We need to change the narrative and show girls how STEM changes the world, for the better. We need girls to know that we need their voices at the STEM table.



Female role models make an enormous, positive difference in a girl's life. As our world moves ahead at an astonishing rate, fuelled by advances in STEM, each one of us has a part to play to ensure that no girl gets left behind.



CHOICES CHANCES CHANGES

The team at I Wish would like to thank our private and public sector partners, and the Higher Education institutes, schoolteachers, and incredible network of I Wish alumnae for your loyalty and support. You are helping to provide inspiration and encouragement to the STEM women of the future.

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ANYTHING IS POSSIBLE

#NoGirlGetsLeftbehind

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