

I loved mathematics and I was good at mathematics; I was also certain I did not have what it took to be a mathematician.

Sara N. Hottinger

Author, *Inventing the Mathematician: Gender, Race, and Our Cultural Understanding of Mathematics*

State University of New York, 2016



Context

- We need more mathematicians (especially maths teachers)
- We want a diverse mathematical community
- We want promising mathematicians to feel they “belong” to the community

What word did successful first year students use to describe how they felt on their first day at university?

Diversity

Need to Diversify

- Mathematics pipeline is important for UK economy
- We have a lot of leaks!
- Many students who were good at maths become disillusioned with it or are not considered good enough to develop.

A near miss

- I found [mathematics](#) and interpreted my struggle as a sign that I was [not](#) to succeed. I [quit](#) on a mathematical career and decided to pursue other interests. It was not until two years after I left school that I realised how much [I loved it](#). I worried that I had given up too early and, by counting myself out, had missed the opportunity to do something I loved.

Robyn Goldsmith (BSc Mathematics graduate and current PhD student
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Barriers to belonging

- Lack of diverse and relatable role models
- It is not clear what a mathematician does
- No one talks about the state/benefits of being stuck
- It's assumed that you understand the language used
- The transition from school to university still needs improving

Being stuck

When I first started my degree, I had [a low opinion](#) in my ability. Believing I did not have what it took to finish, I set a goal to just make it through to the end of the first term. My lecturers at Greenwich were the ones who really changed my outlook. They taught me t

I remember one particular conversation where my lecturers spoke about how the most successful mathematicians are stuck for years, if not decades, on just one problem. [I was inspired](#) and realised that maybe the only person that was holding me back from being the mathematician I wanted to be, was me

Robyn Goldsmith

How to diversify?

- Whilst many universities will still stick to level maths others will need to be aware of other entry requirements that could feed into maths degrees:
 - Core maths
 - T-levels
 - Access courses
- These may need changes to first year modules or a foundation year.

Belonging

Tony's story

- School sent many to study maths at
- White, male, straight, middle class,
... every privilege going
- No doubts about my right to belong
as a mathematics student

Contrasts

Tony:

- Financially secure with student grant
- Supportive family all with university experience
- No caring responsibilities
- No health problems
- Lived 2 minutes from lecture rooms

Many of today's students:

- Must earn money as they study
- First generation at university
- Have children or other caring responsibilities
- May have health problems
- May have long journey to university

Possible microaggressions

- (i) Language like “obvious”, “trivial”, “easy”
- (ii) Symbols like, t , π , ∞ , ...
- (iii) Examples referring to Peter, John, Bill, ...
- (iv) Apparent assumptions that “mathematicians” are male, white, ...
- (v) Use of gender as example of a binary variable

Other ways to accidentally exclude people:

- Jokes they don't get
- Cultural references they don't get
- References to sports they don't understand

These all lead people to feel they don't belong!

History and names

- Mathematical history is diverse but most of the mathematicians students hear about in the curriculum are white men
- Names of results can be problematic
 - (“Marriage Theorem”)
 - Some results are named after people with unpleasant views-how do we deal with that?

Assessment

- People are good at different kinds of assessment
- (Sir Roger Penrose needed extra time in exams!)

Belonging to the community

- Communities create their identity through their language, conventions, jokes, etc
- On the one hand, sharing with students the community's conventions helps them to acclimatise
- On the other hand, feeling that they don't understand may lead them to feel they don't belong
- How can we help students feel that they belong to this community?

Conclusion

Conclusion

- We haven't given answers
- There is tension between helping students getting used to unfamiliar mathematical practices and helping them to feel that they belong
- We should think about microaggressions
- And how to avoid unnecessary barriers
- The world has changed and today's students don't have the background some of us had in the past
- To meet the national need for tomorrow's industries we need to diversify talent

References

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Thank you.

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