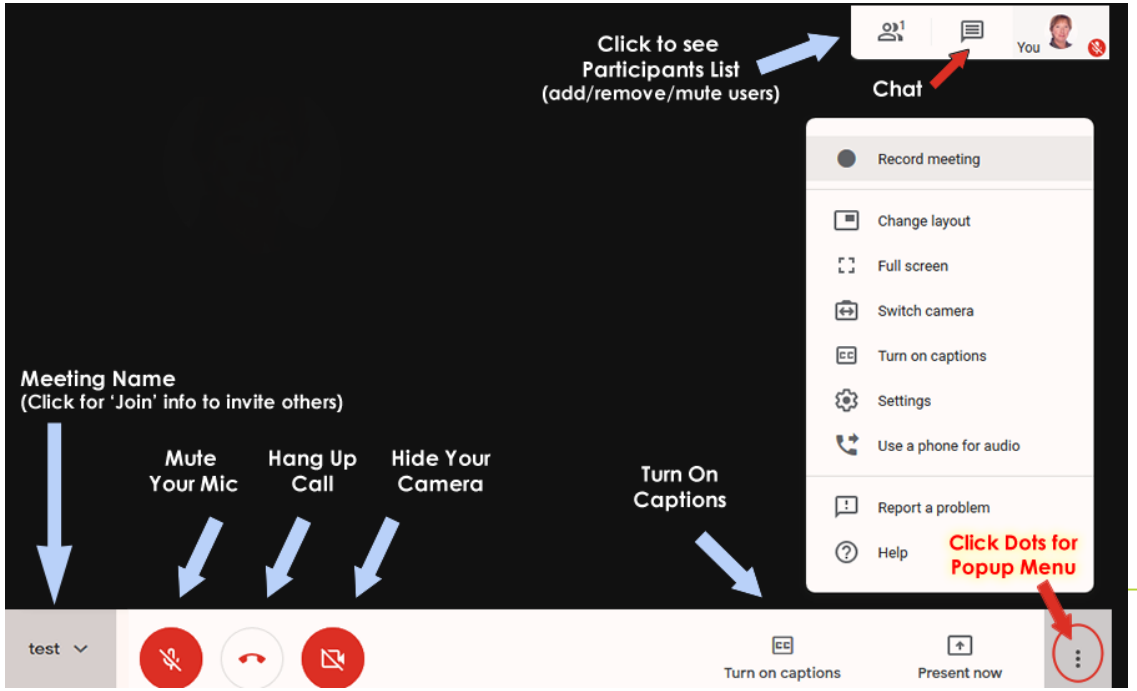
Shaping our future through STEM: How to promote STEM through the learning environment

Please take note of the protocols for during the session

Please take a moment to say hello in the chat box and tell us where you are from…



Protocols:

- Turn off your camera
- Mute your microphone
- Post comments, questions and thoughts into the chat window
- The chat will be facilitated by one of our team
- The event **will** be recorded

Twitter: #STEMNorth #STEMnation

North Regional Improvement Team

Where are Regional Teams working?

Numeracy & Mathematics:

- Iona Coutts

Improving Gender Balance & Equalities:

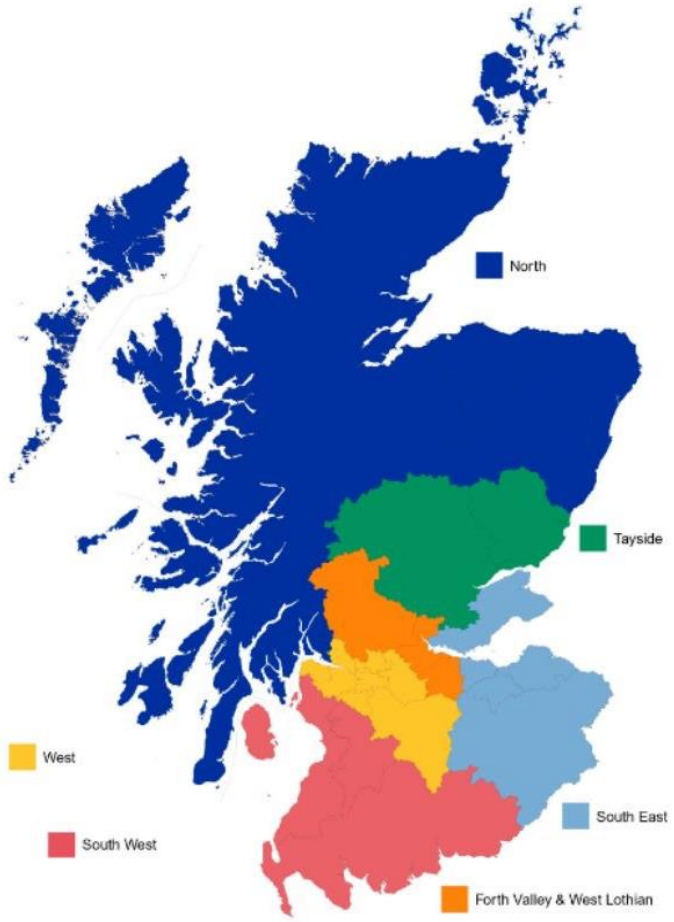
- Jen Hodson

Digital:

- Susan Sey

STEM:

- Janey Irving
- Mark Irwin



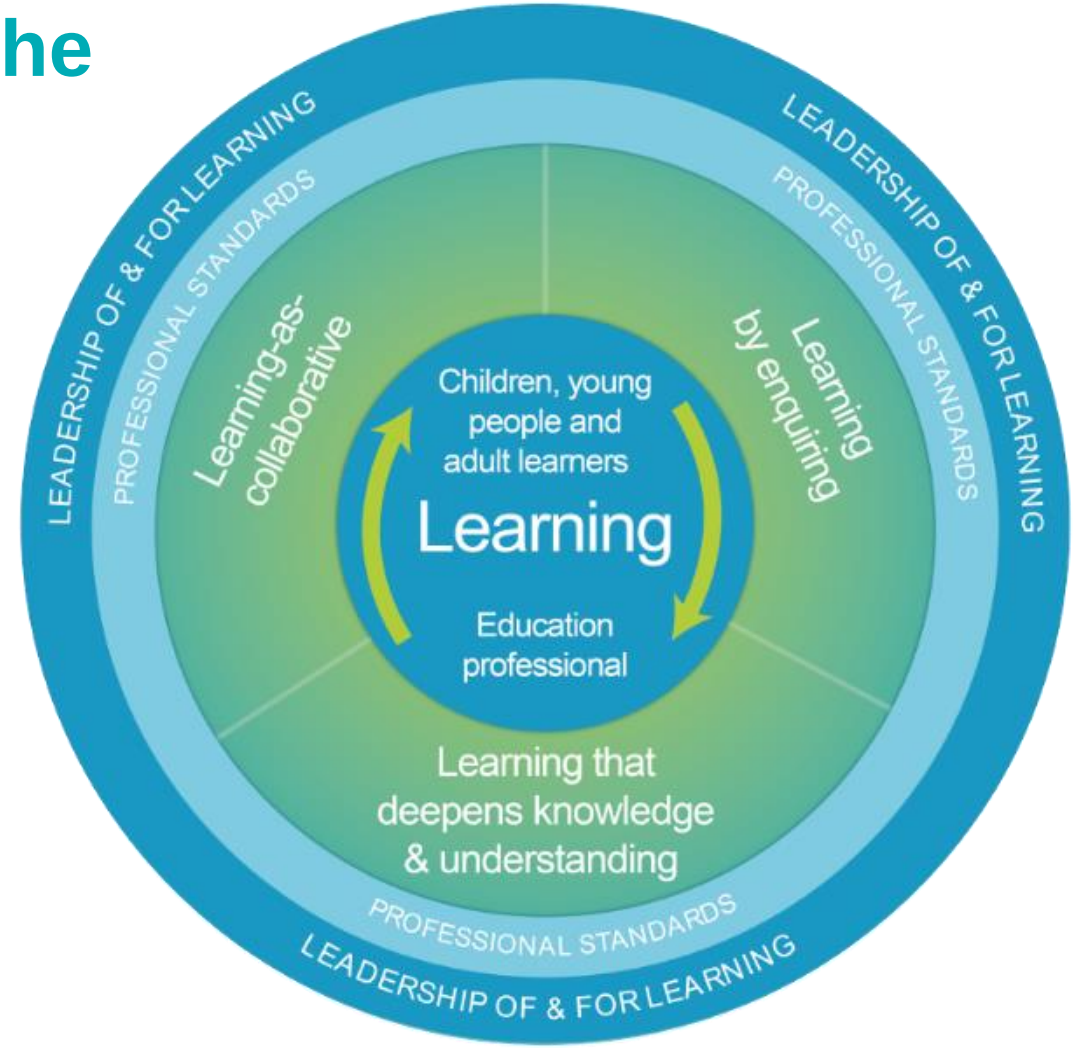
How to Promote STEM through the Learning Environment

Aim

- Reflecting on how we promote STEM through the learning environment, aka our interactions, the experiences of the learners and the spaces we teach in

Session outline

- Context
- How do stereotypes connect to STEM?
- Interactions + Practical considerations
- Experiences + Practical considerations
- Spaces + Practical considerations



Aspires 2

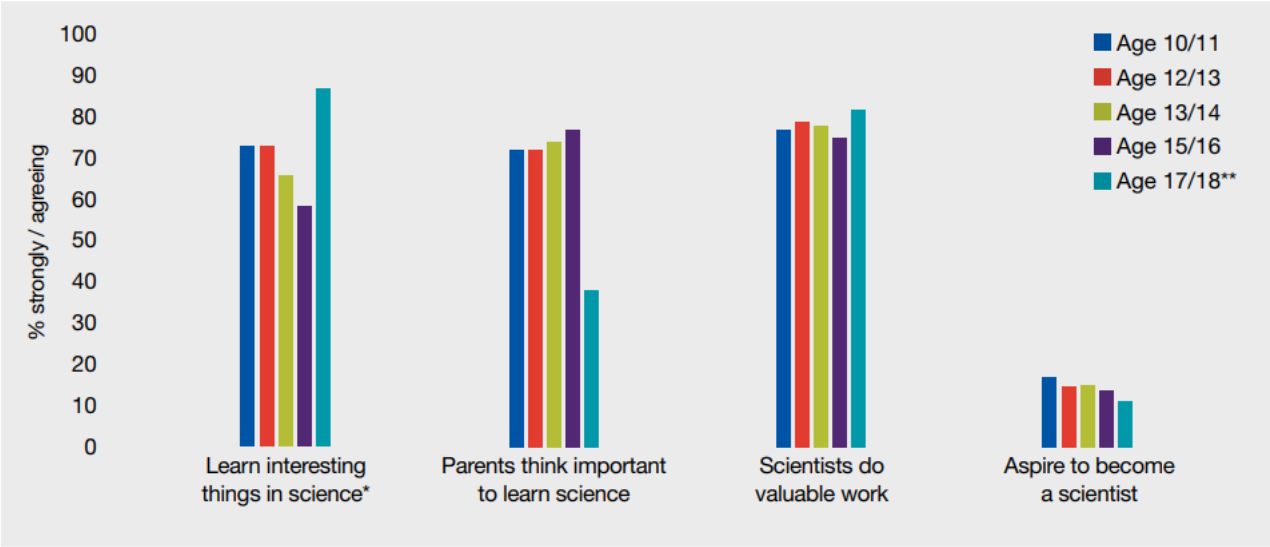


Figure 2. A summary of young people's science interest, perceptions and aspirations by age – survey data from over 40,000 students aged 10-18. ***Note:*** *Only asked of students aged 17/18 studying at least one science A Level. **The data from students aged 17/18 is weighted to national A Level science entries.

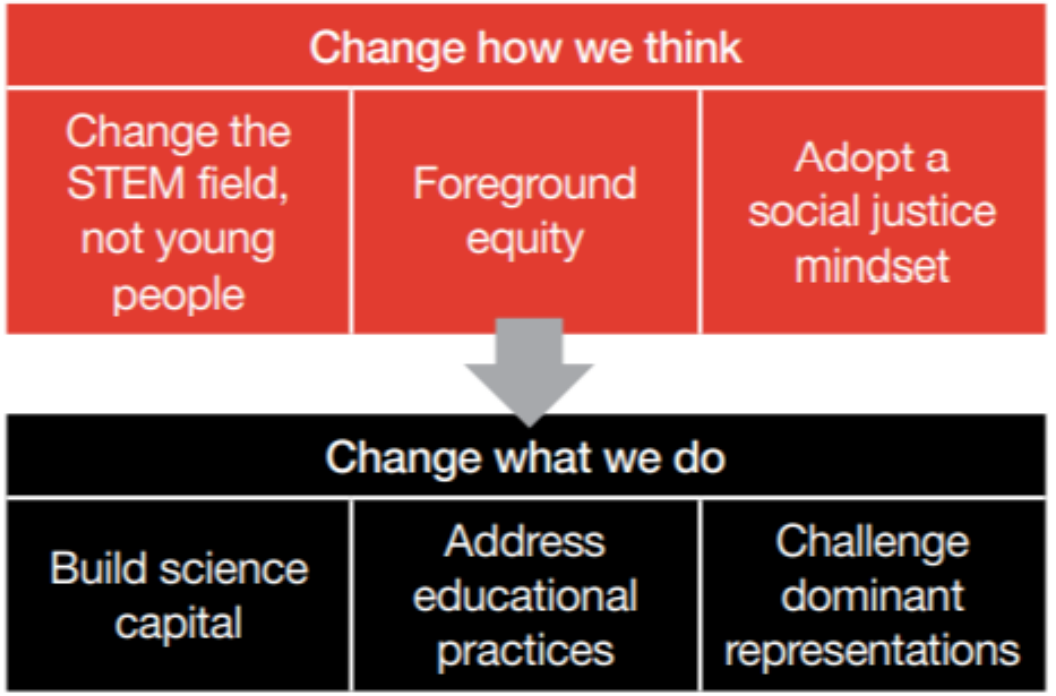
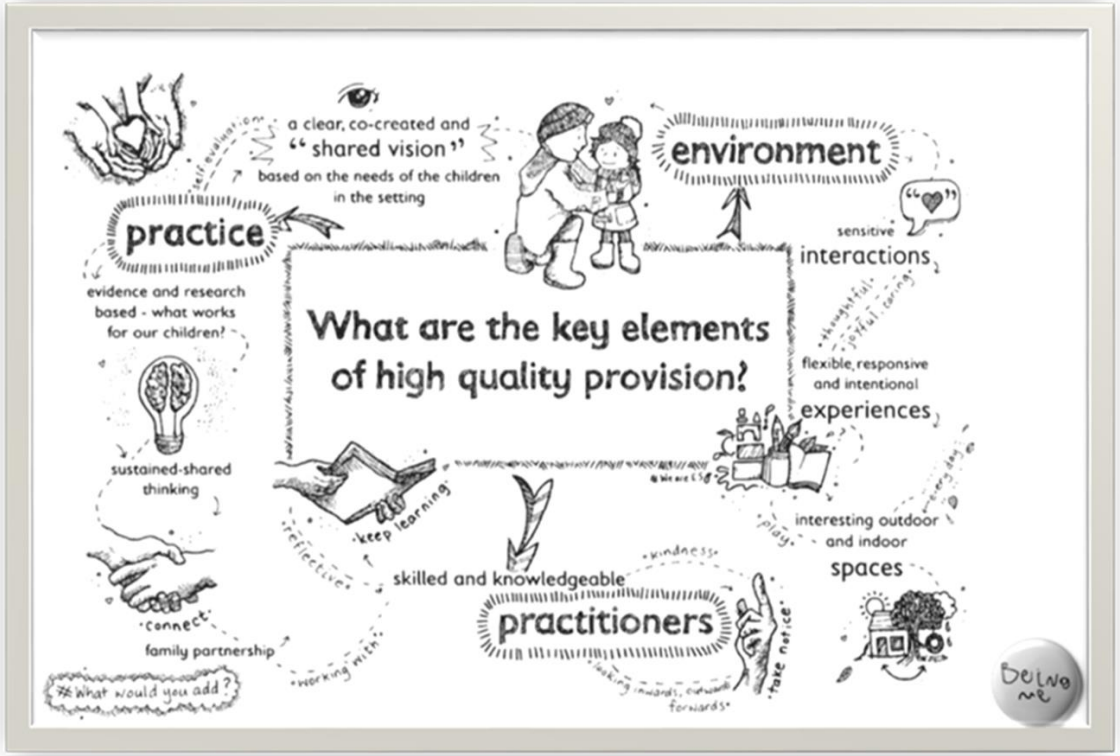


Figure 4. Overview of recommendations for policy and practice.

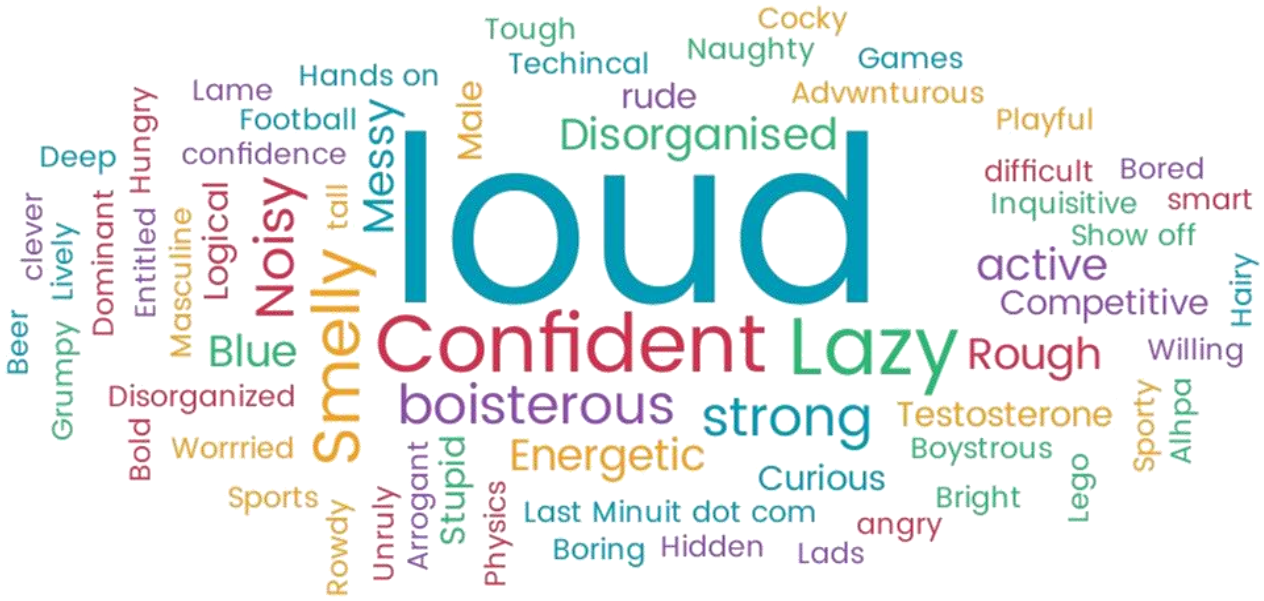
Realising the Ambition

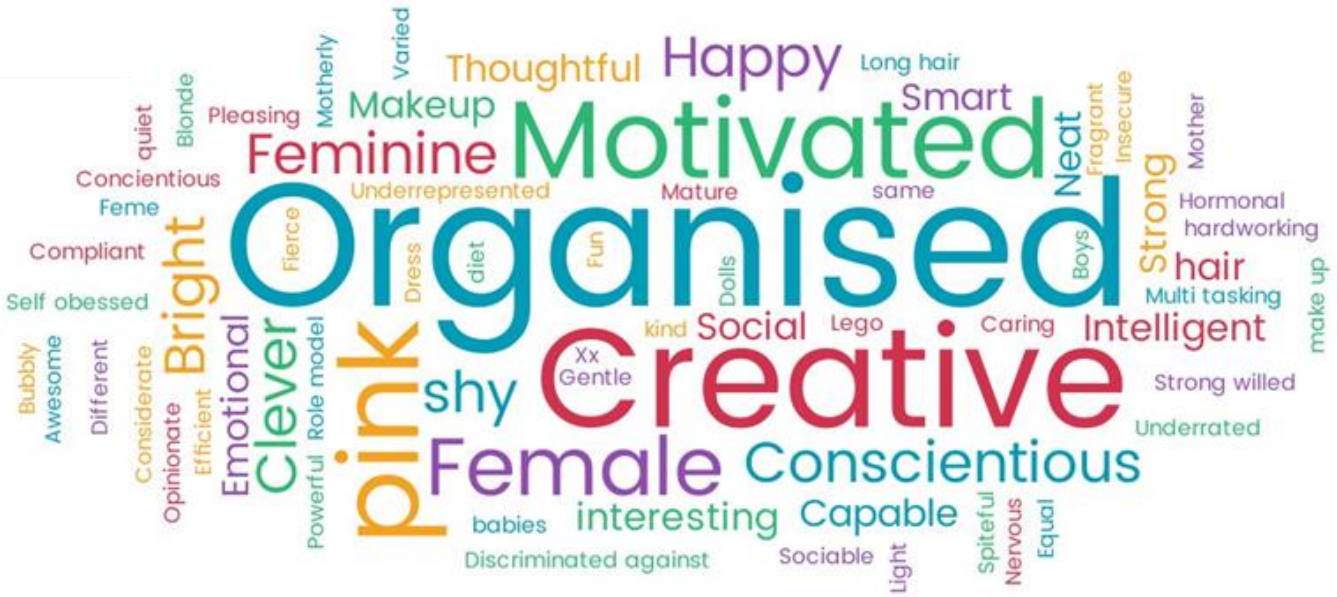


A stereotype is a widely held belief or generalisation about the behaviours, characteristics and roles performed by specific groups of people.

Task: Consider a stereotypical scientist:

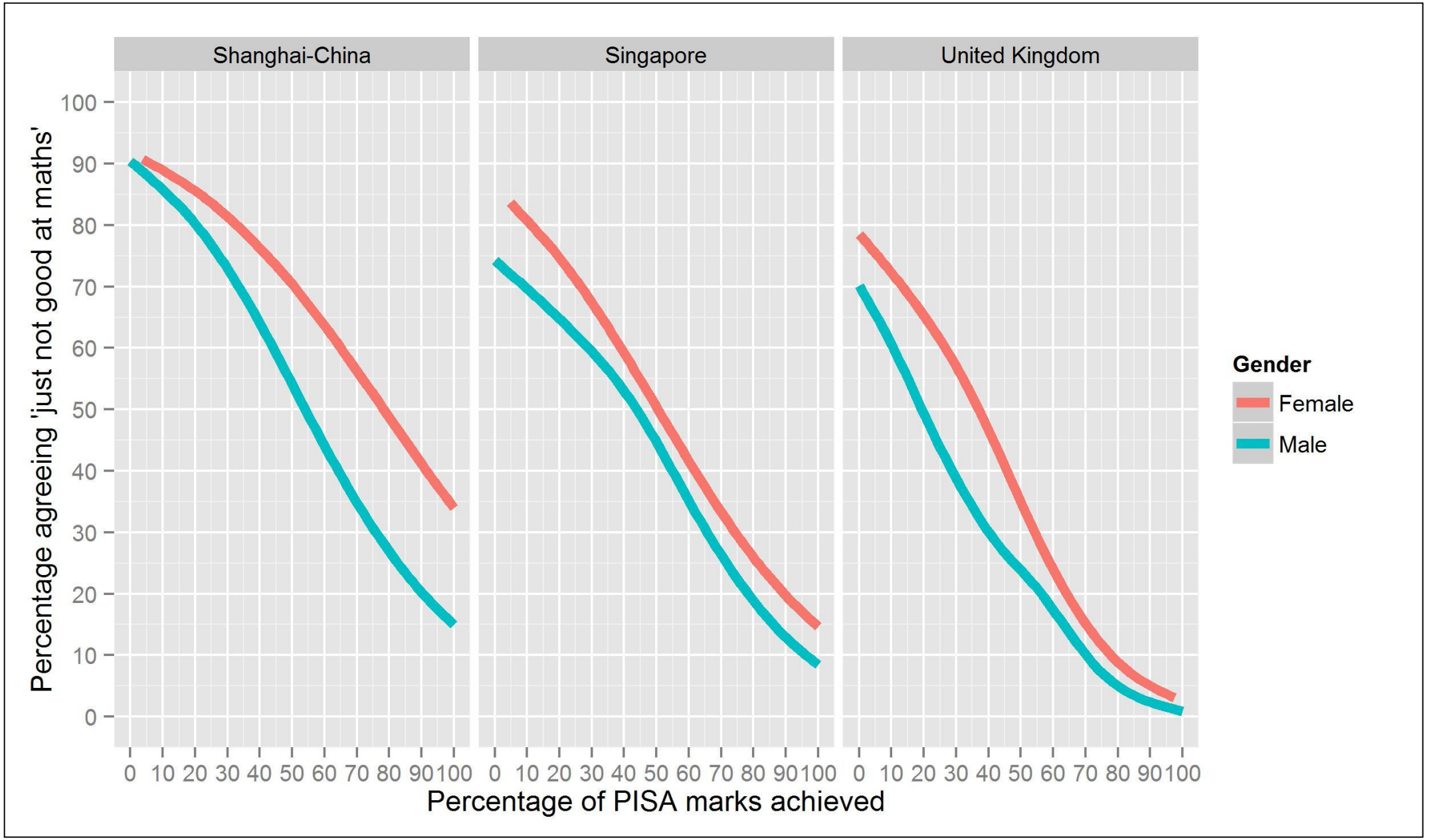
- Associated words or phrases
- Likes/Dislikes
- Expectations (skills, appearance, aspirations, personal qualities, educational attainment)


loud
Confident
Lazy
Smelly
Noisy
Messy
Disorganised
Rough
boisterous
strong
Energetic
Blue
Curious
Testosterone
Boystrous
Competitive
active
Tough
Techincal
Cocky
Naughty
Games
Hands on
Lame
Football
rude
Advwnturous
Playful
Deep
confidence
Male
difficult
Bored
Inquisitive
smart
Show off
Hairy
Willing
Alhpa
Sporty
Lego
Bright
angry
Last Minuit dot com
Boring
Hidden
Lads
Physics
Stupid
Arrogant
Unruly
Rowdy
Sports
Worrried
Bold
Disorganized
Beer
Grumpy
clever
Lively
Dominant
Entitled
Hungry
Masculine
Logical
tall

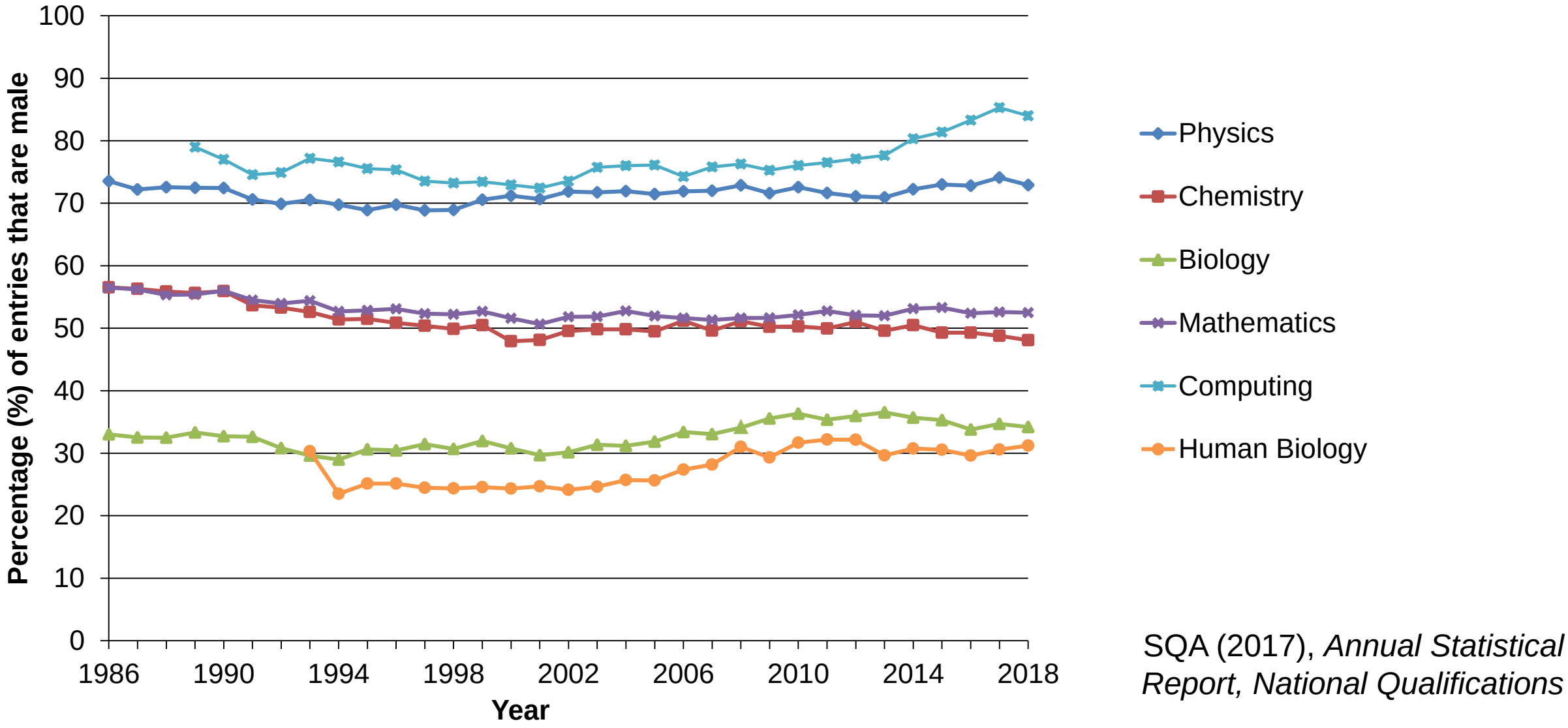

Organised
Creative
Motivated
Female
Conscientious
pink
Feminine
Clever
Bright
Emotional
shy
Happy
Thoughtful
Smart
Makeup
Intelligent
Social
hair
Strong
Neat
Capable
interesting
Discriminated against
babies
Sociable
Long hair
Mother
Hormonal
hardworking
Multi tasking
Strong willed
Underrated
Caring
Lego
kind
Xx
Gentle
Role model
Powerful
Opinionate
Considerate
Efficient
Different
Awesome
Bubbly
Self obessed
Compliant
Concientious
Feme
Underrepresented
Mature
same
Pleasing
Blonde
quiet
Motherly
Varied
Fragrant
Insecure
Fierce
Dress
diet
Fun
Dolls
Boys
make up
Spiteful
Nervous
Equal
Light

What toy ads on UK TV tell children

Let Toys Be Toys, 2015


Shanghai-China
Singapore
United Kingdom
Percentage agreeing 'just not good at maths'
100
90
80
70
60
50
40
30
20
10
0
0 10 20 30 40 50 60 70 80 90 100
Percentage of PISA marks achieved
Gender
Female
Male

Gender balance in uptake of Highers



SQA (2017), *Annual Statistical Report, National Qualifications*

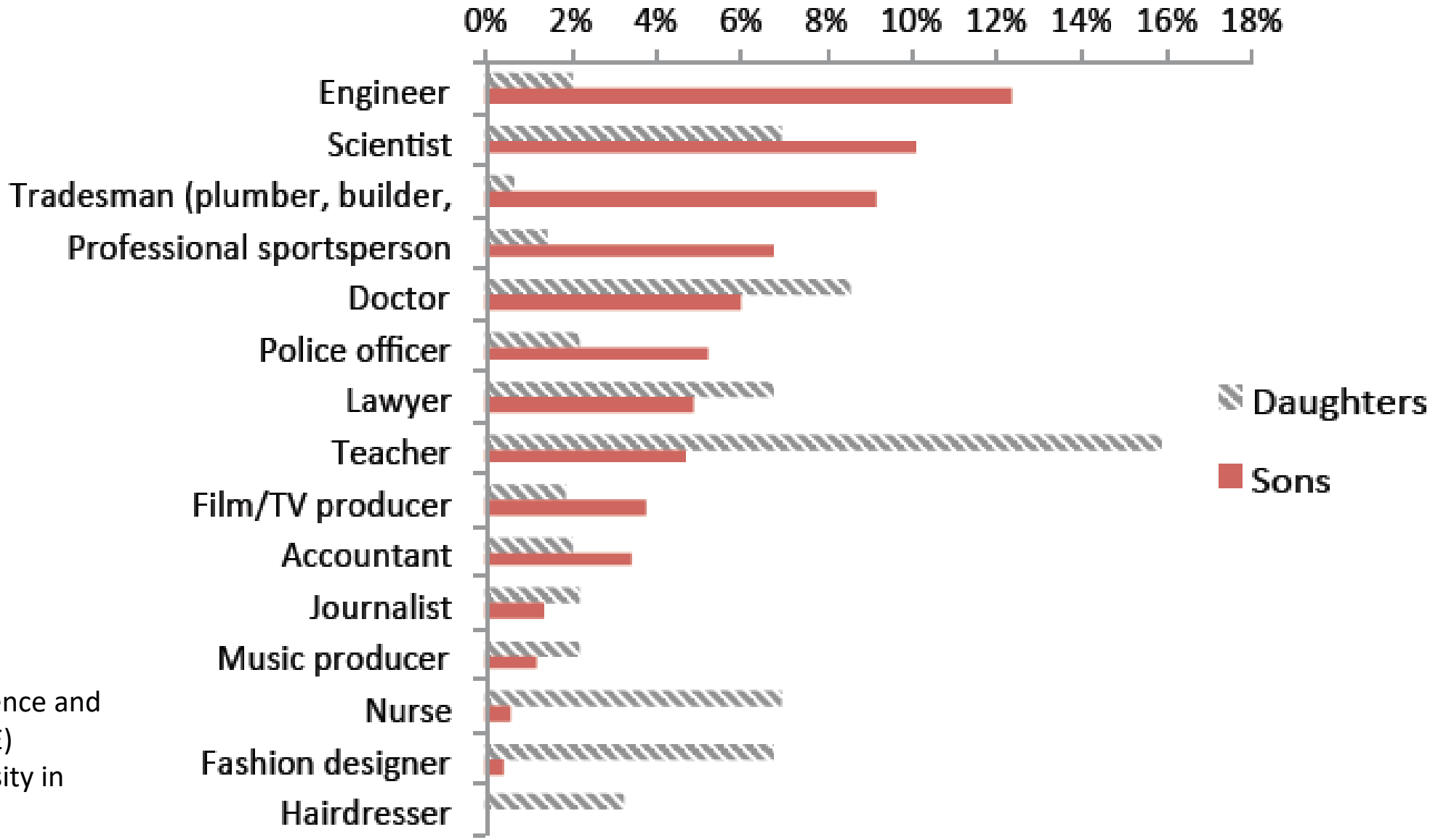
Maths Level	Cohort	%Cohort A-C	% Cohort A	% Cohort D-E	5-year trend	Comment
N5	S4 Boys	33% 34%	19% 18%	11.5% 12%	Steady but slight increase	Girls slightly out-perform boys with presentations at 50% compared to 44.5% and more As.
	S4 Girls	37% 38%	21% 21%	13% 13%	Steady but slight increase	
H	S5 Boys	21.5% 21.5%	10.5% 10.5%	7% 8%	Fairly consistent	Very similar presentation levels with very slightly higher performance from girls.
	S5 Girls	23% 22%	10.5% 10%	6% 8%	Fairly consistent	
AH	S6 Boys	8.8% 9.0%	3.9% 4.1%	3.8% 3.7%	Slight increase since 2016	Uptake from boys higher than girls consistently, but numbers are small.
	S6 Girls	5.2% 5.5%	2.5% 2.4%	1.7% 1.9%	Slight increase since 2016	

‘Children’s aspirations appear to be shaped by gender-specific ideas about certain jobs…

… Over four times the number of boys wanted to become Engineers (civil, mechanical, electrical) compared to girls… nearly double the number of boys wanted to become scientists compared to girls’

- Education and Employers (January 2018)

Parents

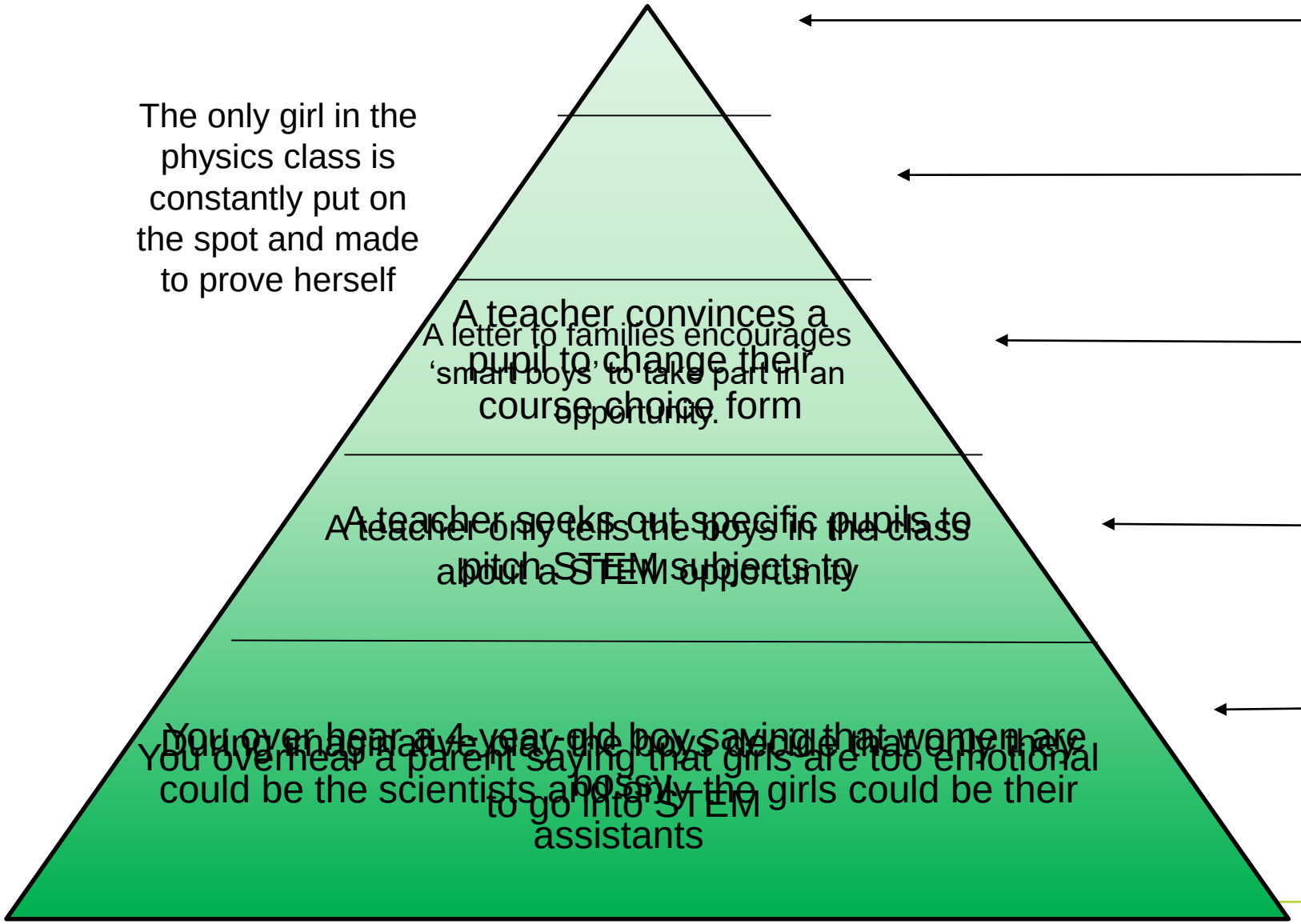


Campaign for Science and Engineering (CaSE) "Improving Diversity in STEM", May 2014

Going forward…

- Deeper look at these three areas
- Practical considerations to help mitigate the impact of stereotyping and actively promote STEM

Allport's Scale (structure devised 1954)



Societal inequality – mass discrimination, violence, economic and political inequality.

More harmful behaviours – violence (physical and non-physical), individual hate crimes

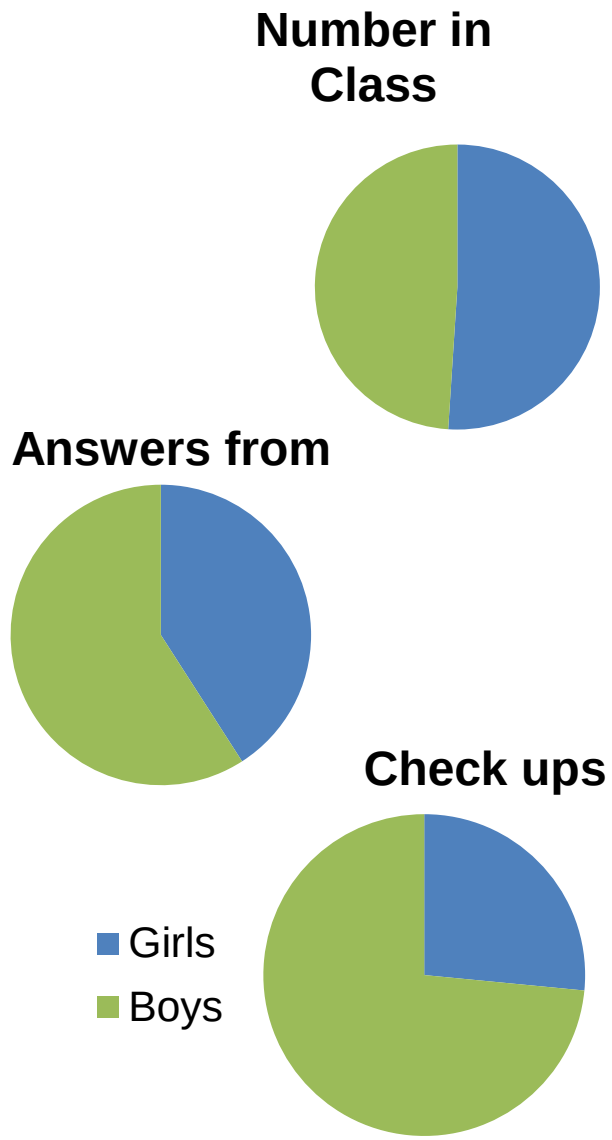
Discrimination – denying services, jobs, rights to person from 'out-group'.

Avoidance – avoiding interaction with 'out-group' or group stereotypes held about

Antilocution – stereotypes, bias, everyday sexist language.

In schools:

	Criticised for	Praised for	Result
Girls	Work content (Receive less negative feedback in general than boys.)	Good behaviour Effort	Loses confidence in academic abilities. Blames self
Boys	Behaviour	Work content Ideas - Processes Understanding	Retains confidence in ability *despite* criticism. Blames external factors



Where all children were given the sort of feedback most often given to girls, they tended to lose confidence in their academic abilities.

Job Stereotypes

Caring

Gentle

Empathetic

Compassionate

Make a difference

Sensitive

Supportive

Job Stereotypes

Strong

Intelligent

Leaders

Confident

Skilled

Funny

Make tough decisions

Job Stereotypes

Strong

Intelligent

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Make tough decisions

Job Stereotypes

Caring

Make a difference

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Sensitive

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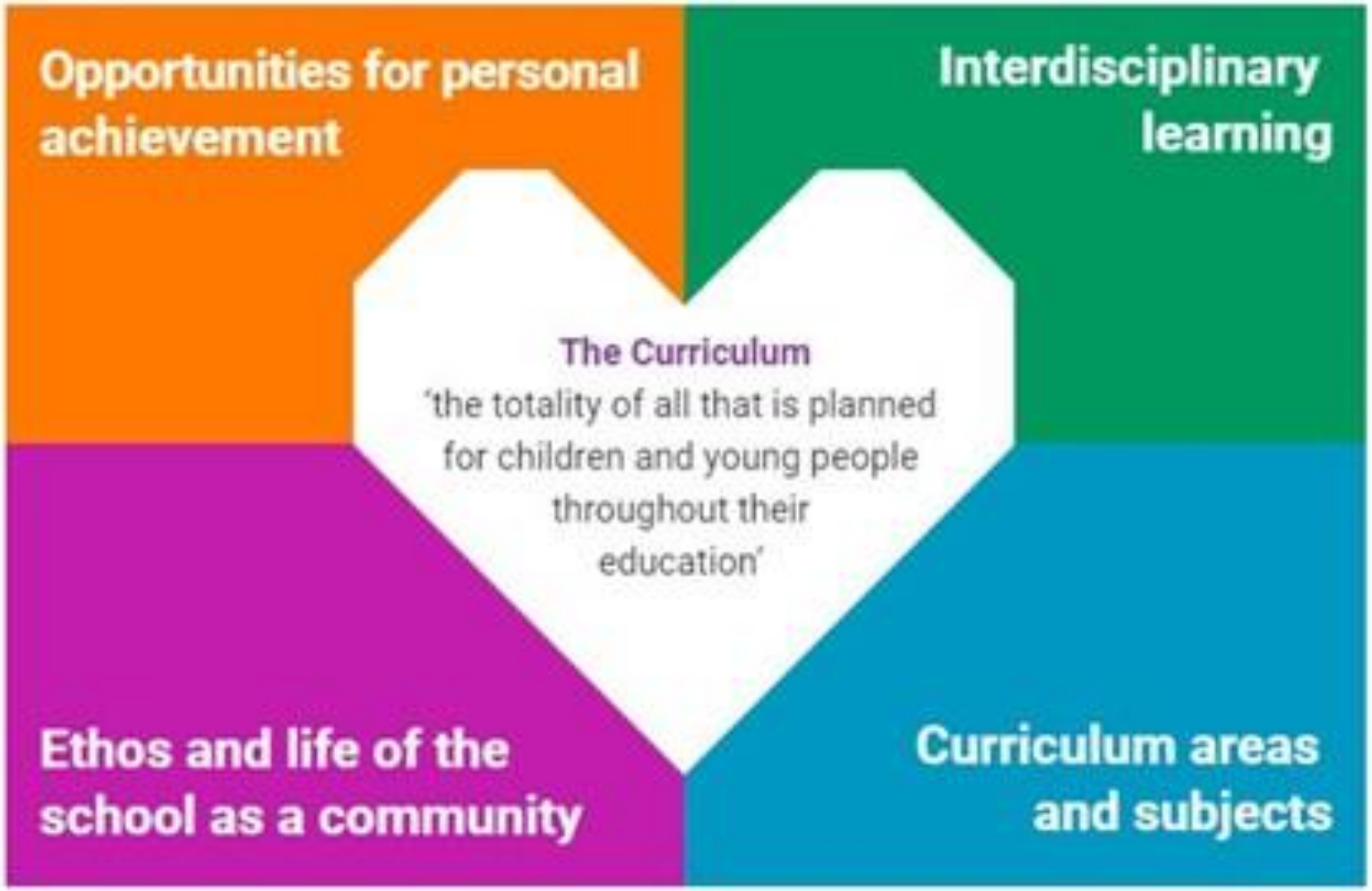
Practical Considerations

- Reflect on your own unconscious bias
- Consider the use of gendered wording
- Reflect on how sexist language is challenged
- Consider how you give feedback and what the focus of the feedback is (ties in with experiences)
- Consider the words we use to describe careers, jobs and tasks (ties in with experiences)

Experiences



"Learning through play is about continuity; bringing together children's spheres of life - home, school and the wider world, and doing so over time"

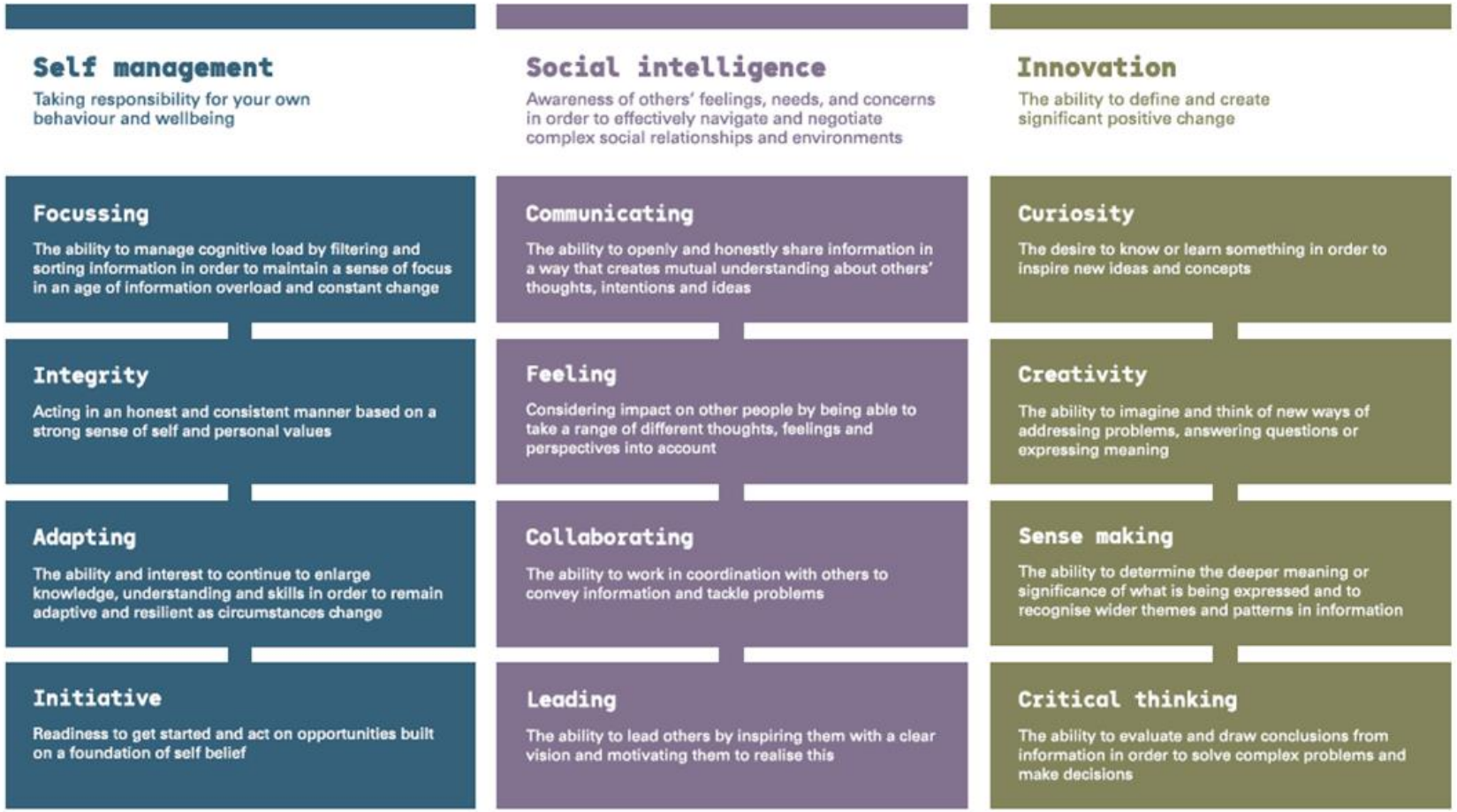
- Susan MacKay, Director of Teaching and Learning at Portland Children's Museum

What toy ads on UK TV tell children

Let Toys Be Toys, 2015

Skills for the future: Meta-skills

Timeless, higher order skills that support the development of additional skills and promote success in whatever context the future brings



Practical Considerations

- A focus on reflecting with the learners on the skills being used in the different learning experiences
- Actively designing experiences that promote meta-skills in all curricular areas

What if/Imagine if…

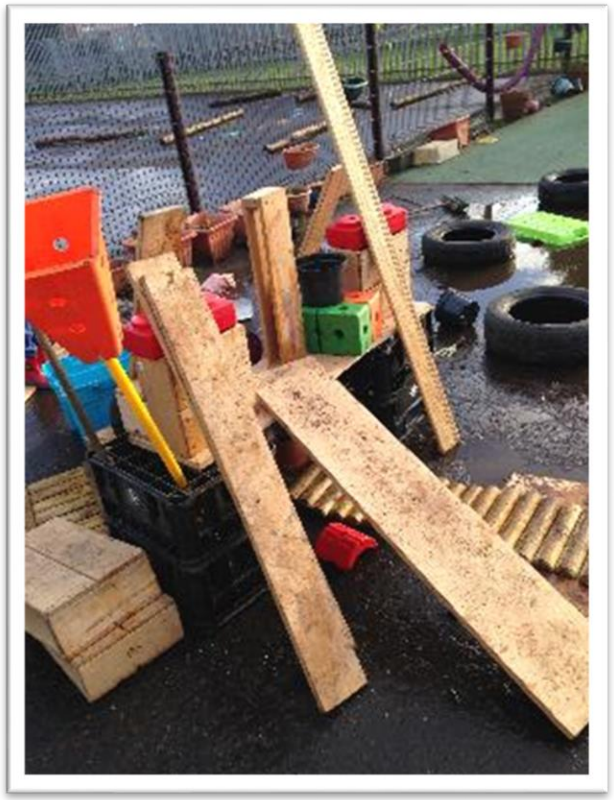
Simulation

Design brief

Spaces

What are your spaces telling your learners?

Compare these learning environment spaces. What stories do you think they tell?



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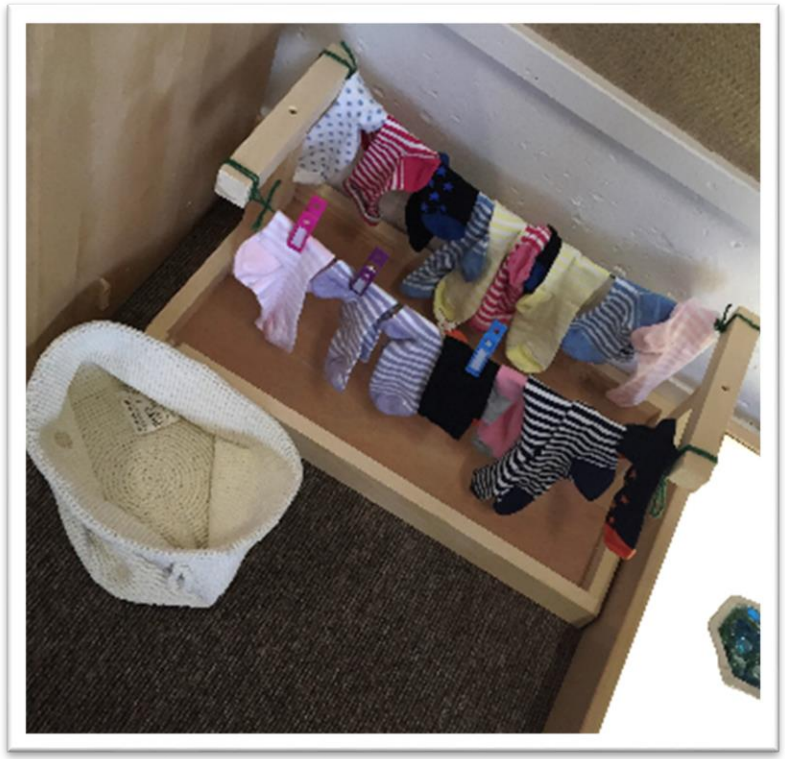

Compare these learning environment spaces. What stories do you think they tell?

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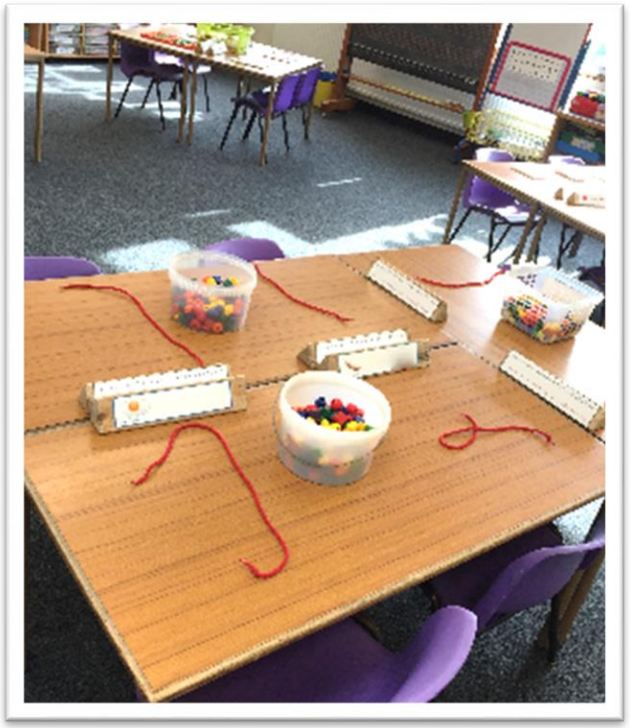

Is your space fit for purpose?

- Has the environment had any element of co-creation with the learners or is everything there for your benefit?
- Are there messages on display that have been discussed with the learners, such as role models, career paths, etc?
- Do your spaces encourage use of STEM skills or is everything done for the learners?
- Are all areas of your space accessible to all, inclusive to all and challenging of stereotypes?

Conclusions

Planning and evaluation

- What will you do as a result of engaging in this professional learning activity?

- Please complete the webinar evaluation: http://bit.ly/STEMintheNorth

Numeracy & Mathematics

- Education Scotland's numeracy & mathematics Professional Learning Community – a one stop shop for key documents, links and guidance. A practitioner Glow login is required for this site
- Making Maths Count final report and review report
- National thematic inspection report for numeracy & mathematics
- Supporting Numeracy at home - resources for families on Parentzone Scotland
- Numeracy & Mathematics Professional Learning Resources – published August 2020
- Improvement Hub Resources – numeracy & mathematics resources on the National Improvement hub
- Follow us on Twitter: @edscot_maths

Get involved:

- Maths Week Scotland is 28 September - 4 October 2020

Technologies & Digital

- Digilearn.scot is our digital learning community
- DigiLearnScot videos on YouTube
- Practitioner support for online remote learning
- Education Scotland’s Digital Learning and Teaching Strategy
- Technologies Professional Learning Community in Glow
- Digital Schools Award Scotland
- Glow Connect Blog
- Microsoft Educator Centre
- Google for Education Teacher Centre

Improving gender balance & equalities

- Improving gender balance and equalities 3-18 page on the National Improvement hub
- Supporting gender balance & equality – resources for families on Parentzone Scotland
- Gender Stereotypes: An Introduction Action Guide
- STEM Aspires Reports
- IGBE Wordpress
- Looking at Gender Balance in STEM subjects at School
- Ideas and Activities to Explore Unconscious Bias (Sway)

- Follow us on Twitter: @EdScotIGBE

STEM & Science

- National STEM Education & Training Strategy and Annual report
- STEM Resources page on the National Improvement hub
- Our Sciences and STEM Wakelets link to lots of useful resources for learning & teaching
- Our STEM Blog keeps you up to date with STEM news and you can follow us on Twitter: @STEMedscot and @EdScotSciences
- GLOW Sciences PLC – the Science professional learning community on GLOW
- Supporting STEM at Home – resources for families on Parentzone Scotland

Get involved:

- Young STEM Leaders programme
- British Science Week is 5-14th March 2021. This year's theme is *Innovating for the future*