Writing Inclusive Questions

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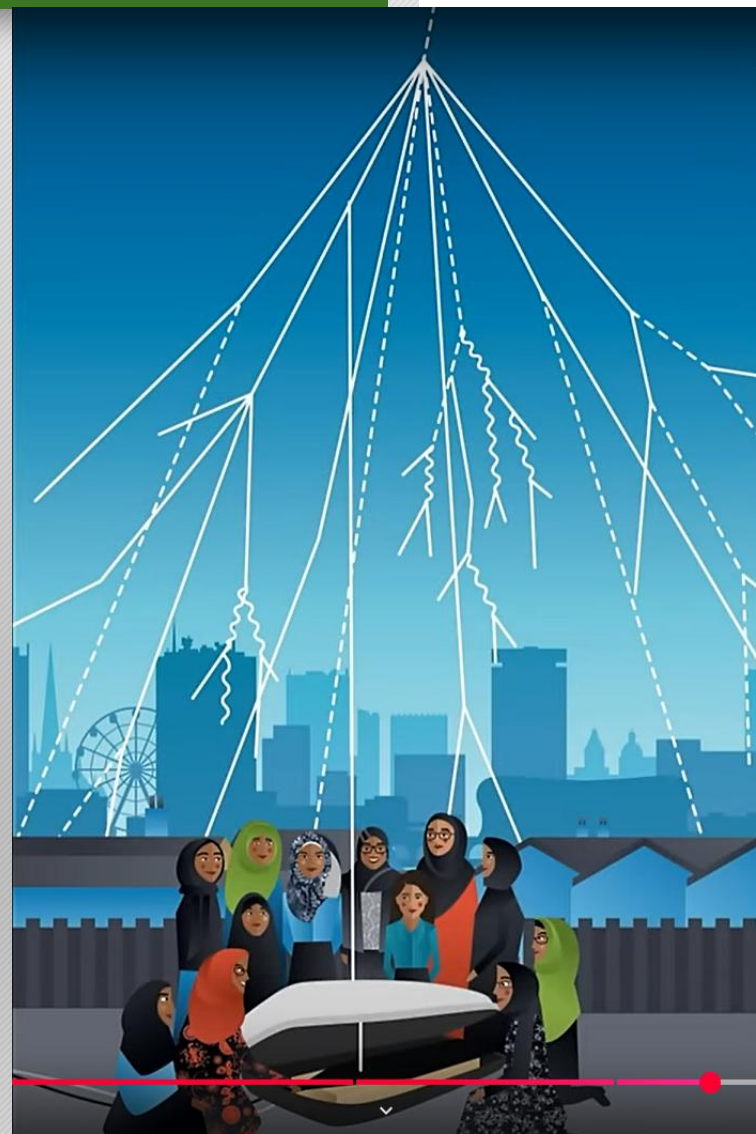
Why consider inclusivity?

- We need to **increase diversity** in our physics community to fully benefit from the contributions (skills and perspectives) of women and other under-represented groups.
- Currently, **participation remains patterned** by gender, ethnicity and social class.
- "Despite there being little evidence of a gendered attainment gap in school science, inequalities in patterns of participation in many STEM subjects and early occupations persist"
- "These inequalities are not new; they are mirrored across national contexts and are experienced even more acutely by women of colour" (Convertino, 2020; National Academies of Science and Mathematics, 2020) (https://bera-journals.onlinelibrary.wiley.com/doi/full/10.1002/berj.4102)
- ASPIRES project: research shows that **attitudes about who can become a scientist form between the ages of 10 – 14.**
- DeWitt, J., & Archer, L. (2015). Who Aspires to a Science Career? A comparison of survey responses from primary and secondary school students. *International Journal of Science Education*, *37*(13), 2170–2192. https://doi.org/10.1080/09500693.2015.1071899

Embedding diversity and inclusion in question-writing

- **Attitudes** and **interest** play a key role in influencing STEM participation
- **Social factors**: family and out-of-school experiences are also important
- "**Science capital**": multiple dimensions including:
- **dispositions** (e.g. whether science is seen as useful and relevant to everyday life),
- **behaviours** (e.g. how people engage in science activities out of school, such as reading science books or visiting science museums)
- **social capital** (friends or family members with science jobs or qualifications)
- **scientific knowledge and literacy** (e.g. understanding a scientific method) (Archer et al., 2015).
- **Science identity**: seeing science as "for me"
- **Self-efficacy**: seeing myself as good at science
- **While over two-thirds of a nationally representative sample of 10–14-year-olds in England found science interesting, under a fifth aspired to be a scientist in the future. (DeWitt et al. 2011)**



Embedding diversity and inclusion in question-writing

- Who writes the questions?
- Who reads the questions?
- What do questions teach us about physics?
- What do questions teach us about society?

- **Increasing the diversity of teachers who feel confident to write questions will enrich our perspective on physics and make students and teachers feel more welcome in the physics community.**

1 Discuss, in terms of quantitative relationships where possible, the factors that determine the acceleration of a skier on a ski slope. [8 *marks*]

A small sphere is released from rest and, after falling a vertical distance of 0·5 m, bounces on a smooth plane which is inclined at 10° to the horizontal. If the sphere loses no energy during the impact, why do its directions of motion immediately before and immediately after the impact make equal angles with the normal to the plane? [4 *marks*]

Find the distance, measured down the plane, between this impact and the next. [8 *marks*]

https://www.cambridgeassessment.org.uk/Images/1974j-physics-alevel-questionpaper.pdf

Two skaters are standing, at rest, opposite each other on an ice rink.

Skater **A** has a mass of 40 kg and skater **B** has a mass of 50 kg.

A 40 kg **B** 50 kg

Skater **A** pushes against skater **B** with a force of 30 N.

(a) (i) What does Newton's third law tell us about the force that skater **A** experiences from skater **B**?

https://www.ocr.org.uk/Images/678042-question-paper-paper-3.pdf

Applying a Science Capital approach to question-writing

- A large part of students' experience of doing science and measuring their attainment is doing questions.
- So questions that empower, encourage and foster a sense of belonging and achievement are important.
- Seeing "people like me" in questions
- Seeing "my experiences and knowledge" represented in questions
- Using accessible language (e.g. rubric, Latin)
- Questions for your classes can reflect their reality (compare with exam questions which aim to be as neutral as possible)
- Moving away from a deficit model in which diverse students are expected to conform to stereotypes
- Focus on what we really need students to demonstrate to show competence

A checklist for new questions

- **C**larity
- **R**epresentation/neutrality
- **A**ccessible contexts
- **V**ocabulary
- **E**xplanations/diagrams
- **S**entence length