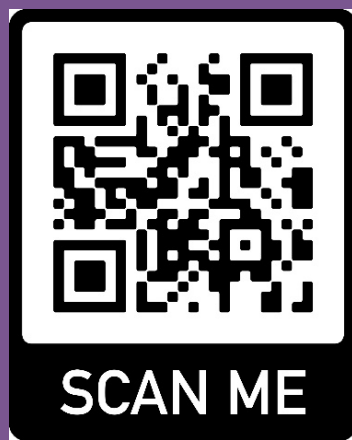


Student Experiences in STEM: Views and Opinions of Educators

Layan Kawas | Dr. Billy Wong



Introduction

Across higher education institutes in the UK, there has been a disparity between the proportion of White UK-domiciled students and BAME UK-domiciled students that achieve a 2:1 or higher in their degrees. This disparity is found even when controlling for prior attainment¹. With the need for STEM graduates increasing with time, it is important to consider aspects of student experiences that contribute to poorer attainment. STEM faculty (lecturers, tutors etc) can have a profound impact on a students experience. Research has shown that inclusive teaching practices impact a student’s performance more than prior attainment². To this end, it is important to consider the point of view of STEM lecturers and professors.

- Aims**
- Further understand views and opinions of STEM staff at the University
 - How do they provide an inclusive learning environment?
 - How can we improve and provide equitable learning environments for BAME students?

BAME: refers to those self-identified as from a Black, Asian and Ethnic Minority decent

BAME ‘Attainment gap’: Difference between proportion of White UK students who achieve a “good degree” and BAME students.

STEM: Science, Technology, Engineering and Mathematics

What did I do?

The main scope of my project involved conducting interviews with STEM faculty. Alongside carrying out interviews with staff across STEM disciplines, I analysed survey data taken from undergraduate mathematics students in their first year, and once again in their second year.

- **Survey Analysis:** the student survey on wellbeing aimed to better understand views and opinions of current STEM students. Analyses was carried out to examine any differences between responses in first year and second year, as well as trying to find patterns.
- **Interviews and Analysis:** the semi-structured interviews aimed to better understand views and opinions of faculty across STEM disciplines (Mathematics, Pharmacy, Chemistry etc.) The questions addressed challenges, issues of inclusive and diverse teaching and the BAME ‘attainment gap’ in higher education. Analyses aimed to find common themes and issues in answers as well as alternative viewpoints.

Survey Analysis

- A total of 87 mathematics students completed the survey in their first year, of which 52 went on to complete the second survey a year later
- Survey responses were a scale of 1-5 with 1 being strongly disagree and 5 being strongly agree
- Proportion of BAME to White UK students was insufficient to make comparable differences
- Statistical analysis carried out to compare first and second year responses

Sense of Belonging, Confidence and Engagement

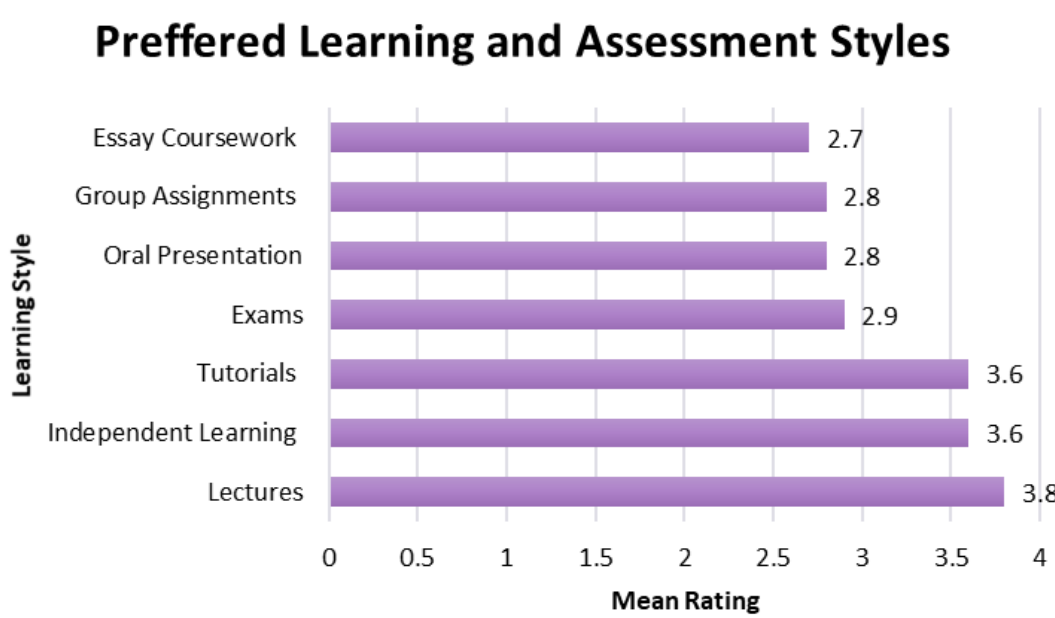
This part of the survey assessed students levels of engagement, confidence and sense of belonging at the university and within their department. There was no differences between students responses in their first year and responses in their second year

Preferred Learning and Assessment Methods

The second year students (n=52) were asked to rate different methods of teaching and assessment in place at the university. All of the styles had an average mean rating below 4, the highest being lectures at 3.8. As this was taken from mathematics students, it comes as no surprise that essay coursework was rated the lowest at 2.7.

Equality and Inclusive Learning

In this section, students were asked about the extent to which they felt they were treated equally by faculty and peers. The overall mean was 4.75, showing that students did feel a sense of equality. They were also asked if they agree that their lecturers provided an inclusive learning environment. Of the 52 students, 65% agreed with this statement.



Future Directions

- Recruiting BAME students to complete surveys/ interviews/ journals to further understand their point of view and try to find out what obstacles **they** find on their journey in higher education

Interview Analysis

- A total of 20 participants were recruited via email, whereby they voluntarily agreed to take part and gave consent to do so
- Interviews took place in a quiet environment and audio recorded for future transcription and analysis
- Semi-structured interview guide was created with the help of supervisor, based on gaps in the literature and particular points of interest
- Brief summary of questions provided below along with key quotes – full report³ can be found by scanning QR code

What do you find challenging about teaching in higher education?

- 1) Wide range of abilities students have before coming into higher education
- 2) Engaging and motivating students
- 3) Convincing students of independent study for a successful degree
- 4) Poor student to staff ratio (in some departments)
- 5) Balancing research with teaching
- 6) Administrative work

“There must be something about the way that UK organise, run and conduct themselves which presents this barrier”

“How to engage students in study is quite challenging”

Why do you think the BAME ‘attainment gap’ exists?

- 1) **Lack of Role models**
- 2) Low representation of BAME staff and faculty
- 3) An unknown systematic barrier created by universities
- 4) Reasons external to the university (socioeconomic background, commute, problems at home, mental health)

Do you believe your STEM curriculum is ‘too white’?

- **Mathematics:** difficult to say due to numerical nature
 - Some argued that although the content may not be, the way it is presented to students is
- **Construction & Meteorology:** Not necessarily too white, but definitely very UK-centric
- **Chemistry:** some argued that it does not lend itself to issues of diversity
 - Reaction names used to remember important reactions are all European/ American
- **Computer Science:** content may not be too white but advancements may appear to favour white people

“I’d certainly say that it’s where our curriculum tends to be in terms of the historical discovery we talk about is very white and male.”

How do you incorporate teaching into your learning?

- **Pharmacy:** mention diseases that certain ethnic minorities are more susceptible to
- **Quantity Surveying:** bring light to more examples from buildings in different countries
- **Chemistry and Mathematics:** difficult due to scientific and factual nature of content
- **Generally:** creating diverse groups for group work, using different means of assessment

How do you think we can diversify the curriculum/ improve diversity?

- 1) Highlighting current and historical achievements by BAME scientists
- 2) Bringing in alumni who have gone on to be scientists
- 3) Creating websites that celebrate role models from underrepresented backgrounds who made significant achievements
- 4) Initiate mentoring schemes (also provides role models)
- 5) Giving students more choice in what modules they study

“Role models I think is important, but those role models have to be specific to our students and relatable specifically to our students”

“You can’t be what you can’t see... Diversity drives Excellence”

Recommendations

With the openness and willingness of interviews providing researchers with optimism for future change, using literature and remarks made by interviewees we have several recommendations for staff to tackle the BAME attainment gap.

- **Open discussions about race**
- **Examining and challenge own privileges and biases**
- **Meaningful commitment and cooperation across all departments to move towards change.**

References

1. UUK/NSS. 2019. Black, Asian and Minority Ethnic Student Attainment at UK universities: #Closingthegap. London: Universities UK
2. Killpack, T.L. and Melón, L.C., 2016. Toward inclusive STEM classrooms: What personal role do faculty play?. CBE—Life Sciences Education, 15(3), p.es3.
3. <https://research.reading.ac.uk/sestem/wp-content/uploads/sites/98/temp1/SESTEM-UROP-report-Final.pdf>

This project was supported by the UROP (Undergraduate Research Opportunities Programme) scheme at the University of Reading. UROP is managed by Careers.