

RESEARCH ARTICLE

Barriers to mathematics learning and engagement created by academic stereotypes and experiences

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Abstract

In a Higher Education context, most research into stereotypes focuses on the negative impact of stereotypes that educators hold about students. However, this study focuses on whether students also hold stereotypes about academic staff, and whether this also results in negative consequences for students. Focus groups with students in both mathematics and humanities departments identify four potential barriers to student learning and engagement created by the stereotype that staff are intellectual, powerful, research-focused and middle-aged white males. Implications for students and steps that staff can take to address these barriers are discussed.

Keywords: Academic stereotypes, student engagement, student belonging.

1. Introduction

Following Fricker (2007), 'stereotype' refers to widely held associations between a social group and specific attributes, and such associations are considered indicative of a stereotype even if the term itself is not explicitly used. Stereotype threat is characterised as where an individual feels at risk of conforming to a negative stereotype held about them, and this fear leads them to underperform and perpetuate the stereotype (Steele and Aronson, 1995). In an education context, stereotype threat is almost exclusively framed in terms of the negative consequences for the learner based on their fear of stereotypes held about them by their educator. For example, it has been demonstrated in connection to ethnicity (Osborne, 2001), gender (Spencer et al., 1999) and socio-economic status (Croizet and Claire, 2021). However, this study considers what stereotypes undergraduate students hold about university staff and whether these also create barriers to student learning.

The project was borne out of an open call for academics to come together to discuss whether they had experienced stereotype threat. Approximately 12 staff members, including the authors, took part in an initial discussion, with the authors then choosing to meet regularly and form a research team for the current project. Further discussions within the team provided a starting point for research considering the issue of academic stereotypes, but the team needed to begin with their own experiences before researching and understanding those of others. The research team comprised two female and two male academics who had not previously worked together on a project, all of whom are White British and educated to doctorate level. It emerged that they were conscious of stereotypes held about them by colleagues based on background: *"I am conscious of, and at times have felt inferior to, many senior colleagues who attended grammar or private schools and are Oxbridge [Oxford or Cambridge] educated"*; being teaching-focussed: *"When introduced as 'Professor', I get embarrassed, unsure if I've truly earned that title. I worry people will expect many*

books and I have to awkwardly explain I'm not that kind of professor"; or being female: "As a female colleague I have experienced male academic behaviour towards me that has been demeaning and, sometimes, simply rude." It was evident academic stereotypes had influenced, shaped and, at times, obstructed the team members' professional identities and ability to do their work. As the research drew on their prior experiences, the process of reflecting, sharing, analysing and writing required them to live, tell, re-tell and re-live their professional life stories.

However, the discussions led the research team to reflect on whether students also hold stereotypes about staff and if the notion of stereotype threat could be turned on its head, and that there may be negative consequences for the holder of the stereotype. Academic stereotypes are derived from norms, and, in a selective university, those norms still enable some while obstructing others. Identity, gender, role focus and nomenclature have influenced each author's self-perception and understanding of their place in the academic hierarchies. As one team member observed: *"This all speaks to fundamental issues about the role and identity of a university and its members, including what titles signify and what work 'counts'. These complex social norms are what make projects like this so pertinent."*

Research shows that the use of language in Higher Education, such as 'Teacher', 'Lecturer', 'Dr' and 'Professor', significantly influences the student-teacher relationship (e.g. Ellis and Travis, 2007). Research suggests that these titles can shape both the identity of educators and impact their interactions with students (Baxter, 2012; Hockings et al., 2009). The complexity of the Higher Education environment, including increased external accountability, pressure to teach employability skills as well as subject knowledge, diverse student needs and research targets, further complicates these interactions (Lea and Callaghan, 2008; Hockings et al., 2009). Therefore, the language used in universities can have a profound effect on how the Higher Education community sees and interacts with one another. Further research has shown how stereotype threat and silencing can alter and affect the Higher Education experience for both students and academics (Fisher, 2010; Fisher, 2021).

This study builds on many of these insights and asks how certain terms are heard and responded to in a large Russell Group university in the UK. The research questions what stereotypes students hold about staff and what impact this has on student learning and engagement for mathematics and humanities students.

2. Methodology

This research into academic stereotypes took a layered approach to investigating the issue. Firstly, focus groups with nine humanities students set out to establish what academic stereotypes exist. Students were presented with various academic terms, e.g. 'professor', and asked for the associations, experiences and feelings the words created. Although all the students studied humanities subjects (e.g. philosophy), no context or subject disciplines were attached to the words presented. Subsequently, a second set of focus groups with seven mathematics students explored the impact stereotypes had on staff-student interactions. The mathematics students were asked to describe the roles and types of academic staff. Inevitably, the conversations for both humanities and mathematics students meandered and covered both perceptions of academics and lived experiences.

Once the data had been collected, a thematic analysis of each of the humanities and mathematics data was undertaken by two team members to enable a range of perspectives on the initial coding or thematic analysis. Further discussions then interrogated the themes and commonalities which had arisen from each researcher's analysis.

The data was sufficiently rich that the emerging themes could be organised in multiple ways, each giving subtly different emphases to the findings. For example, the research could have focussed purely on the language and labels students use to describe staff. However, in this paper the focus is on the impact of academic stereotypes on students in terms of their barriers to engagement and learning. Each researcher then added what they perceived to be relevant data under headings that had been collectively agreed.

3. Barriers to students

Collective discussion of the data identified key themes around academic stereotypes. The humanities data establishes student perceptions and the assumptions they hold about staff based on the language used. The mathematics data explores how stereotypes, whether perceived or experienced, play out in an academic school and the real, potential or perceived barriers these create for student engagement and learning. These themes are discussed below with quotes from students which exemplify the views expressed.

3.1. Intellectual barrier

One stereotype prevalent in the comments from both humanities and mathematics students alluded to academic staff being on a different intellectual level to students. This may partly be due to language because the word 'academic', for example, can be: *"daunting and create an immediate divide"* (humanities student). Several mathematics students said this intellectual divide was intimidating, such as: *"I almost felt intimidated slightly because they are so incredibly intelligent"* (mathematics student).

This assumption that staff are on a different intellectual level means students become anxious about interactions with staff. When students think about 'engagement' with staff it stirs unhelpful feelings: *"I personally feel imposter syndrome sometimes, and myself and my classmates talk about how we don't feel comfortable contributing unless we have something really good to say. I guess there's like an invisible pressure that we put on ourselves so I feel nervous about contributing."* (humanities student) and negatively impacts interactions: *"it can be difficult to sort of engage them sometimes just because there is such a [intellectual] gap"* (mathematics student), especially in whole-class discussions: *"if you're sometimes asked a question, you'll think a bit like 'Oh God, he thinks I'm really stupid'"* (mathematics student).

The student comments suggest overcoming the barrier can be achieved by staff adopting a more responsive attitude: *"the lecturers I get along with most are definitely ones that seem to have a never-ending capacity for unusual questions"* (mathematics student).

In mathematics, presenting material at an appropriate level and pace for students to engage with requires careful thought: *"their brains work much quicker than ours and it clicks for them, not necessarily for us"* (mathematics student) and inclination: *"I've had a lecturer that's very senior taking a first-year module, and clearly they are like much smarter than all these first years, and obviously they have much more interesting things to be doing than teaching first-years rudimentary maths"* (mathematics student).

3.2. Status barrier

Student comments suggest a stereotype of academic staff being placed, or placing themselves, on a pedestal. This is partly due to the job titles and hierarchies within Higher Education: *"You have 'associate professors' and then 'professors' and 'assistant professors'. It's very strange. And you're like, 'What are the differences?'"* (mathematics student). It also relates to the power staff hold over

student learning: *"I've had both positive and negative experiences that helped me understand how much power they [professors] hold in making a module interesting for me. This ultimately determines the quality of work I produce for it too"* (humanities student).

This unbalanced power dynamic between staff and students can manifest itself in the way staff teach. For example, 'lecturer' is associated with: *"the impression that they are not approachable and speak at you rather than with you. I think the term 'lecture' in itself feels passive and aggressive rather than promoting a positive and inclusive learning experience"* (humanities student). Further, it gives staff unnecessary control of the view expressed: *"I felt from them [professors] they tend to restrict student's opinions in terms of studying they tend to teach only liberal side and never mention about right wing side or mention it in a negative way that I often felt so limited and frustrated"* (humanities student).

The stereotype is therefore that students perceive academics to feel self-important, reinforcing any student imposter syndrome. This stereotype strongly contrasts with student perceptions of school teachers who are much more positively viewed: *"Teachers are like extremely approachable"* (mathematics student) and *"Someone who enriches the life of many young people"* (humanities student). While students enjoy a *"much more back and forth, reciprocal relationship"* (humanities student) with teachers in schools, at university students see power symbols like hierarchical job titles, staff being both educators and examiners, and the teacher-led styles of teaching. The stereotype could form a barrier to engagement, particularly for those first-in-family students unfamiliar with university terminology and teaching styles.

3.3. Identity barrier

Students have strong positive associations with the word 'community': *"We are part of the [university] community. It definitely gives a sense of home and belonging which is really important"* (humanities student). However, that sense of community and belonging is closely associated with identity and being with people they identify with: *"Due to the dense Indian population in our university, I've been fortunate to find a sense of community"* (humanities student). Minority ethnic students reported it is sometimes challenging to break barriers and socialise in a predominantly White community due to cultural differences, so they seek community outside the classroom: *"I am an Asian female so I seek finding a sense of community and belonging within societies"* (humanities student).

Within the classroom, students may not identify with the teaching staff. One student noted that sometimes her racial identity was questioned or assumed, whereas others noted the gender imbalance is particularly notable: *"I can only think of one female lecturer"* (mathematics student). While the staff gender balance may vary between subjects, the word 'professor' was associated with: *"usually old male lecturers who are very senior"* (humanities student), and it was noted: *"men are overrepresented in positions of seniority in the maths department generally"* (mathematics student). This perception may contribute to gender gaps in students where, for example, female students only make up around a third of the mathematics cohort nationally. A more subtle identity issue arises around personality types. The introverted nature of some mathematics academics meant they were: *"quite quiet sometimes and you have to kind of make the effort to go [to them] if you want help"* (mathematics student).

The academic system has therefore created a stereotype of White males, perhaps those with the time for solitary focus on research outputs, and the classic *"old Einstein looking man with blackboard"* (humanities student) image of a professor creates both a barrier to inclusion for current students and a barrier to more equitable recruitment in the following generation. However, this identity barrier

may not be one that all students experience depending on the socio-cultural capital they bring to the classroom.

3.4. Priority barrier

Unlike in the school system, where students and teachers are both (rightly or wrongly) measured by student grades, in the university system students and staff have different priorities. Students reported that some staff would: *“much rather be doing research”* (mathematics student) and this can result in poor teaching: *“they turn up and they read their thing off the slides and then they go back to their research”* (mathematics student) and poor pastoral care: *“I’m still not sure what a personal tutor does”* (humanities student).

For some students, being taught by researchers is important: *“I always feel an immense amount of respect for a professor because of how much hard work that must have taken. Generally, I feel like they’re pretty good at expressing ideas and theories”* (humanities student). However, for other students, receiving good teaching is paramount: *“I am of the stance that because you’re good at research doesn’t make you good at teaching. We now value those as two separate skills and you can be good at one not the other, or good at both, or good at neither”* (mathematics student).

The dual priorities of academic staff lead to inconsistent teaching quality, with some staff being: *“very forthcoming and like helping us through it”* (mathematics student) while at other times *“I go to a problem class and I’ll kind of feel like the professor wishes they weren’t there”* (mathematics student) and inconsistent pastoral care: *“I immediately think of the varied experiences myself and my peers have had - some [personal tutors] are great, caring, communicative etc. Others, the opposite of this. I have been so lucky to have a brilliant personal tutor but am aware that this is likely because they are well established in the department and the faculty, so they are incredibly aware of procedures, services etc. because of previous positions they held. I wish it was the same for everyone, but sadly this is unrealistic”* (humanities student).

There is a danger that the competing research and teaching priorities on staff time perpetuate stereotypes previously mentioned and create a barrier for students, increasing experiences like: *“some of the [pastoral] meetings feel like a formality, a box to be checked”* (humanities student), while only more conscientious members of staff shoulder the burden of supporting students: *“how to make the support available more uniform across the board is a whole other question”* (humanities student).

4. Implications

The student data identified four connected stereotypes of academic staff, each of which creates a barrier to student learning and engagement (see Figure 1). But why do these stereotypes exist?

Firstly, they are self-perpetuating. Students who ‘fit in’ whether on economic, ethnic, cultural or personality grounds are more likely to be academically successful, finish their degree and become academics themselves (Beasley and Fischer, 2012). This is the stereotype threat, as applied to students, that is well-documented in the literature. Similarly, newer university staff members may experience stereotype threat compared to more ‘successful’ colleagues with regards to retention and promotion, as is experienced in other workplaces (Walton et al., 2015). Indeed, this project started with staff members meeting to discuss their experiences of stereotype threat. Consequently, stereotypes in the upper echelons of academia are reinforced.

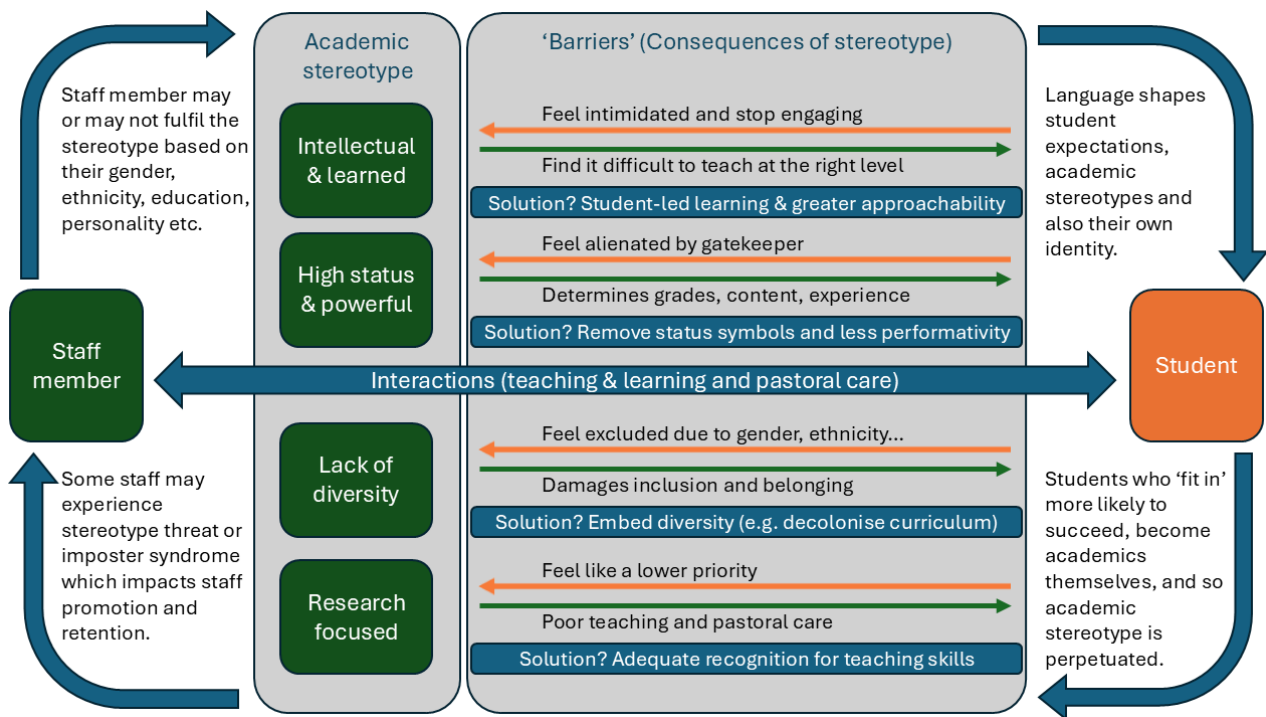


Figure 1. Schematic diagram showing the academic stereotypes, and their barriers to students, as discussed in this paper.

Secondly, there is the language used. Even before setting foot in a university, a student will have pre-conceived ideas from media and marketing material of what it means to be 'lectured' by an 'academic'. Terms that conjure status hierarchies can cause differential treatment of students by ethnicity, gender, or other identity markers (Oldmeadow and Fiske, 2010; Amoroso et al., 2010). Beyond its capacity to 'other' (Phiri, 2014; Sarukkai, 1997), unreflexive terminology also arguably stunts the pedagogical creativity and sense of vocation that initially draws many to academia.

Although prompted in slightly different ways, and despite studying very different disciplines, there is considerable overlap in the themes that emerged from both the humanities and mathematics students. Without being given the context of specific staff or modules, their similar general descriptions of academic staff stereotypes sometimes strayed into describing specific lived experiences. Sometimes these experiences are the consequence of stereotypes and sometimes they help reinforce existing stereotypes. Regardless of how stereotypes are created or whether these stereotypes are imagined or real, it is inevitable that students will approach their next interaction with staff with pre-conceived ideas of the staff member's appearance, role and priorities. Therefore, it is helpful to consider how student perceptions may be addressed and the barriers broken down.

Firstly, students hold a stereotype that staff are intellectual and learned to the point of being intimidating. This could be addressed by staff adopting more student-led forms of learning and adaptive teaching, which are responsive to student queries, compared to the more traditional staff-led didactic approaches where academics project an all-knowing persona that leaves students anxious about engaging them. For example, one of the authors now uses flipped learning, which has been shown to boost engagement and, hence, satisfaction (Fisher et al., 2018).

Secondly, staff stereotypically have high status and use their power to influence curriculum, grades and the student experience. Potential solutions involve removing job titles which, according to the

student focus groups and other research (Morling and Lee, 2020), are meaningless to many students. Additionally, one author now deliberately refers to their family and outside interests when introducing themselves to students to make them more approachable. Staff can also seek to replicate teacher-pupil dynamics seen in schools. For example, one author has used co-creation (Bovill et al., 2016) to give students greater agency in their education and reduce the influence of the staff member.

Thirdly, there is the physical stereotype of an academic based on their age, ethnicity and gender. Multiple initiatives to support equality, diversity and inclusion such as peer mentoring, Athena Swan and widening participation aim to support students not in the majority. It should also be recognised that some staff may experience similar barriers when interacting with senior colleagues. Women, for example, are underrepresented in senior leadership within universities (Grummell et al., 2009) and particularly in mathematics. Within the classroom, solutions may be found in creating a safe environment in which students feel comfortable to express themselves, such as through decolonising the curriculum (Winter et al., 2022).

Lastly, there is the stereotype of function – that staff have to juggle the priorities of research and teaching. Giving greater recognition and importance to teaching for all staff may encourage greater pedagogical creativity and rekindle the sense of vocation that draws many to academia. However, historically, research skills are more highly valued by institutions (Parker, 2008). One department in this study has nearly 30 research professors but no staff focussed on teaching or student experience of the same rank, suggesting the two skills remain unequally valued. The mathematics department has seen substantial growth in the number of teaching-only staff at lower ranks. This replicates a pattern seen at many Russell Group universities, but there is concern this growth has not been strategically planned and is simply to release other staff for research (Wolf and Jenkins, 2020). The data collected in this research strengthens the authors' call for teaching skills to be more highly valued.

In summary, this study has investigated stereotypes held by students about academic staff, and some of the barriers to learning and engagement these stereotypes can create for mathematics and humanities students. It is acknowledged that these barriers to learning will be experienced to different extents by each individual student and may be more prevalent in some departments and institutions than others. Students in the focus groups also voiced positive comments about staff and their teaching but this paper has focused on comments relating to stereotypes, which are typically negative. Experience suggests that stereotypes and their impact will not disappear quickly or with a single initiative, but this paper proposes steps that individuals, departments and institutions can take to create environments in which more students will feel supported and a sense of belonging.

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