

CO-CREATING A PROGRAMME OF BELONGING FOR UNDERGRADUATE WIDENING PARTICIPATION ENGINEERING STUDENTS

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ABSTRACT

Students from low socio-economic backgrounds face significant barriers to progression. Isolation, lack of belonging, and imposter syndrome are genuine concerns for widening participation (WP) students and can undermine attainment and experience. In partnership with students, we co-created a support programme for first-year undergraduates to foster belonging and improve progression and retention. Each element of the programme was carefully curated to build cohorts, develop interpersonal skills, and provide academic and social support, while challenging negative preconceptions about engineering research. Initial evaluation highlighted the residential's impact in easing transition and strengthening belonging. This paper examines longitudinal outcomes, alongside staff and student perspectives on sustaining success. Key challenges, such as low female participation and clashes between religious obligations and study demands, are analysed through an intersectional lens. Student voice was embedded throughout design and evaluation, with staff and student collaboration valued equally to mitigate bias and amplify marginalised voices. By reflecting on successes and flaws, we propose a framework for other universities to enhance WP student transition and outcomes.

Keywords: Widening participation, co-creation, belonging

1 INTRODUCTION

While initiatives to widen participation have expanded opportunities for underrepresented groups, there is growing recognition that access alone is not enough. Students from low socio-economic backgrounds continue to face significant barriers to progression. Feelings of isolation, lack of belonging, and imposter syndrome are genuine concerns for widening participation (WP) students and can negatively impact their academic attainment and overall student experience. Fostering a strong sense of belonging is increasingly recognised as a critical factor for success, both in terms of academic achievement and overall wellbeing [1], [2], [3]. Departmental belonging is not always achievable or desired by students [4], so the creation of an additional cohort to connect with is essential.

Working in partnership with student representatives from Imperial's working-class network and funded by the Royal Academy of Engineering's Diversity Impact Programme, we designed a pre-arrival residential programme for first-year WP students that aimed to instil a greater sense of belonging and address lower levels of progression and retention at Imperial College London. The New Starters' Residential Programme was developed to help students build early connections, develop confidence, and feel comfortable within the university environment before the start of term. Between September 2022 and October 2024, the programme successfully supported 185 engineering students in their transition from school to university. The programme has continued, but this study focuses on the first three years to enable longitudinal data to be examined.

2 PARTICIPANTS

First-year undergraduate engineering offer holders who met the published criteria for contextual admissions were invited to take part: 120 students were invited (52 attendees) during August 2022, a further 133 (60 attendees) during August 2023, and 190 (73 attendees) during August 2024, from across ten engineering departments. The pre-arrival residential was an opt-in programme with a consistent uptake rate of ~40%. Students were categorised as WP based on published criteria, including: low socio-economic background, first in family to attend university, or experience of care or caring

responsibilities. Only Home (UK-based) students were eligible, due to greater data availability to identify WP markers.

This demographic remains underrepresented in academia; HEFCE data shows 14% fewer WP students at UK universities than would be expected based on A-Level grade benchmarking [5], with intersectionality increasing this gap. For example, the ethnicity profile of attendees did not mirror that of the broader student body: 15% of participants identified as Black African, compared with just 4.98% of Imperial's total undergraduate population [6]. Disability was another key intersection identified, with the residential serving as an opportunity for early identification and provision of support.

While most students were aware that they met one or more WP criteria, we did not assume they would feel comfortable being identified as WP among peers. For this reason, participation was opt-in rather than opt-out, and great care was taken to ensure that invitations, and the design of the New Starters' Residential Programme, adopted an asset-based rather than deficit-based approach.

3 PROGRAMME DESIGN

Analysis of institutional data, progression trends, and consultations with students identified four key areas as priorities for widening participation (WP) students: academic progression, retention, enrichment, and belonging. The working group designing the programme included educators, wellbeing advisers, and support staff from all ten engineering departments, and WP student partners from Imperial's working-class network. Students were involved from the outset in co-creating the programme, supporting delivery (including society-led sessions), and contributing to evaluation design, with student union welfare officers facilitating focus groups.

Our design was guided by three principles: belonging-focused pedagogy, asset-based framing, and equitable access. To avoid positioning students at a disadvantage before starting their degree, the programme emphasised pastoral and social activities, and all costs including travel were covered to ensure minimal or zero financial burden.

The New Starters' pre-arrival residential included carefully curated academic and social activities that supported cohort building, developed interpersonal skills, and enabled early engagement with lecturers and student ambassadors. Survey data, student feedback and staff-student collaboration guided initial decisions about session content and activity balance. Activities ranged from sports and library treasure hunts to team-building exercises and workshops on imposter syndrome, as well as academic poster sessions and lab practice, with a deliberately busy timetable to provide multiple networking opportunities and most accurately represent a typical week at university.

The programme was refined iteratively across all three years of delivery, with adjustments to recruitment, timetabling, and activity selection. Notably, arts and humanities-based sessions were introduced in later cohorts following participant feedback. Student ambassadors - many of whom had previously taken part in the residential themselves - provided ongoing insights into both the participant and delivery perspectives, further strengthening the programme design year on year. Overwhelmingly positive feedback from students and staff (100% of participants reported they would recommend the programme to a friend) led to continued delivery within Engineering and, in 2025, adoption of the residential university-wide.

3.1 Designing for Academic Confidence and Belonging

Feedback both via a belonging survey and directly from student collaborators identified a need to instil confidence in academic ability and belonging within departments and wider faculty. Data highlighted the importance of student societies, lack of community within departments and the prevalence of imposter syndrome. Students reported that the size of departments can feel overwhelming, and at times they feel less welcome as a result.

This informed the key theme of networking with a variety of staff in the department and faculty. At a faculty level, there was a welcome lecture from the Faculty Senior Tutor, Associate Dean for Education and an Engineering academic, to inspire students and demonstrate that the faculty cares at multiple levels. Departmental networking events introduced key staff that students interact with in the first year, e.g. heads of department, teaching staff, administrators, wellbeing advisers etc. This humanised these staff members, removing barriers for students to approach staff when they first start. We wanted to ensure students felt comfortable and knew where to seek help if they were struggling during their study before the campus filled with thousands of students.

Other activities included general orientation, including departmental tours featuring offices of key

contacts, exhibitions, lab visits etc., granting independence and familiarity within department buildings. One example of attending the Undergraduate Research Opportunity Programme (UROP) poster exhibition in the Mechanical Engineering department, became an impactful way to introduce students to research programmes and see how their curriculum is applied in real-time. Incoming students networked with older year students, inspiring several students to pursue UROPs in the summer after 1st year. Due to the popularity of the exhibition with the residential cohort, the UROP organiser now schedules the exhibition to coincide with the residential.

3.2 Designing for Social Connection and Community

The residential programme also included opportunities for social connection and community. This included bowling, boardgames, and spending time in the common room with fellow students and ambassadors. Peer-to-peer networking was highly valued, and students later reported relying on the social networks they established during the residential week when later facing challenges.

We encouraged students to try a wide range of activities and remain open-minded. Even less enjoyable tasks, such as being tied together for the welcome scavenger hunt, helped build group cohesion. To balance the packed schedule, we included mindful activities, like gardening and drawing. We embraced spontaneity, for instance an impromptu walk in Hyde Park on a sunny day led by the student ambassadors, which received excellent feedback. Students especially appreciated having space for honest discussions with peers and older students without staff present.

4 STUDENT PERSPECTIVE

Evidence gathered through evaluative student focus groups, surveys, and reflective feedback indicates that the pre-arrival residential achieved its primary objective of enhancing students' sense of belonging and readiness for university. Students attributed the programme's effectiveness to its co-design with student partners [7], its welcoming, asset-based ethos, its visibility of diverse staff who shared backgrounds similar to their own, and the balance of academic and social activities that made the transition feel manageable and meaningful. Anecdotally, participants have a different and less isolating first-year experience to those who have not attended the residential, though there is still research to be done with non-participants to fully understand the impact of the residential, both in the short- and long-term.

4.1 Co-design and an Asset-Based Ethos

Students perceived the programme as relevant and respectful because it was shaped by people with lived experience and delivered with them, not to them [7]. As one student noted, it *"had been made by people who knew what it was like to be in my position, which hasn't been the same for other activities I've participated with other organisations"*. In contrast, students critiqued deficit-framed approaches elsewhere that made them feel they needed to *"catch up"*, reporting that such framing can undermine confidence, leading to students feeling uncertain about their capabilities and whether they will be behind the rest of their cohort even before university starts. By contrast, activities that invited students to voice concerns and shape the space made them feel *"more confident for the next stage"* [7], [8].

Students highlighted how the residential empowered them to voice their perspectives, questions, and concerns about the norms of university life. These conversations encouraged students to articulate their needs confidently and created space for meaningful institutional reflection and improvement. For example, students highlighted the need to re-evaluate prayer facilities and ensure the residential timetable allowed participants to attend prayers without missing activities. This responsiveness to student feedback illustrates how an asset-based approach can surface structural barriers that might otherwise remain hidden and can guide more inclusive programme design and institutional practice.

4.2 Easing the School-University Transition and Clarifying Expectations

Students repeatedly emphasised the challenge of transition: *"The jump from College to University is immense, and it can be a very unfamiliar period for a student"*. The programme addressed this by offering structured exposure to academic and social elements of university life. Early encounters with staff and student ambassadors helped students form a holistic picture of expectations and how to engage proactively in their department. Importantly, the residential reduced barriers to experiences that might otherwise be inaccessible for students from low-socioeconomic backgrounds. For instance, taking part in societies and the chance to sample 'dorm life'. This was particularly valued by commuting students:

“There are some people that live in London and go to accommodation. I would never be able to do that”. By having these experiences, students who commute could feel more included when engaging with peers who lived in student accommodation during term time.

4.3 Building Social Capital and Cross-Cohort Community

Students described the residential as a *“shared experience”* that helped them *“ease into the huge community that is, Imperial.”* They reported that new friendships and networks made their wider experience more sustainable and fulfilling: *“The people I met on the program, having time with them is very like, it makes the other stuff worth it.”* Cross-disciplinary connections were a specific gain - *“I’m meeting lots of students from different departments and I probably wouldn’t have the opportunity otherwise”* - broadening academic horizons and informal guidance networks beyond the programme. Students repeatedly linked belonging with identity affirmation and psychological safety: *“The programme has allowed me to make friends with people in similar situations to myself and has assured me that I won’t be attending here with people overly unlike myself.”* Peer support reduced isolation and supported help-seeking: *“It has been great to have someone to go to when I am experiencing problems, for example when I was stressing about exams and didn’t know how to approach revision.”* The role of ongoing social contact in sustaining motivation was explicit: *“I think the social element is massively important. [...] But just by hanging out with them, you feel happier... that’s what you need to give you the extra boost...”* Experiencing residential-type activities with peers from *“a variety of lived experiences and disciplines”* fostered a *“willingness to communicate,”* which students identified as foundational for future collaboration and confidence in university spaces.

5 LIMITATIONS AND BARRIERS TO SUCCESS

The success of the first New Starters’ Residential in September 2022, and of the subsequent programmes, was underpinned by strong cross-departmental collaboration, a significant degree of goodwill from staff, and sustained partnership working with student ambassadors, officer trustees (Imperial Student Union), and liberation and community networks (Imperial Working-Class Network). Achieving this could be difficult if replicated in larger or less resourced institutions. These collective efforts shaped both the design and delivery of the residential and contributed to its positive reception among participants. In this section, we examine the key insights gained through implementation, outlining the programme’s limitations and challenges encountered across the three years of delivery.

While this model was effective in a pilot context, long-term sustainability requires more formalised resourcing, staff training, and institutional structures to avoid over-reliance on volunteer labour. It is also important to acknowledge that programmes of this nature often draw disproportionately on the time, emotional labour, and expertise of staff and students from underrepresented or minoritised backgrounds. This “minority tax” [9] can place an additional burden on individuals who already carry significant informal responsibilities in supporting inclusion and belonging within the institution. To ensure equity and sustainability, dedicated workload allocation and institutional support that does not depend on the unpaid or under-rewarded labour of those who share similar lived experiences with the participants is required.

The programme operated on an opt-in basis, which attracted students who were already motivated to seek additional support or who felt comfortable engaging in pre-arrival activities. More work needs to be done to better understand the motivations of students who chose not to engage with the programme, and how this has affected their sense of belonging and academic progression at Imperial. Student perspectives gathered on this show that more needs to be done to explain the benefits of the programme, as well as fully subsidising travel costs for students attending the residential. Furthermore, the wraparound element of the programme offers an opportunity for students who initially “opted out” to join the programme once term has commenced. The open invitation nature of this aspect must be greater emphasised to encourage non-attendees to participate.

Capacity constraints linked to accommodation availability, staffing, and funding also limited the number of students who could participate each year. Fortunately, we never met this participation limit, as we always budgeted for a 50% uptake rate, but it is a limitation that other institutions should consider when attempting to replicate the programme.

6 KEY FINDINGS AND RECOMMENDATIONS

Findings from the initial three years of delivery show that the New Starters' Residential Programme was highly successful in strengthening students' sense of belonging, confidence, and readiness for the transition to university. Student feedback consistently emphasised the value of being welcomed into a peer community of others with similar experiences: *"The programme has allowed me to make friends with people in similar situations to myself and has assured me that I won't be attending here with people overly unlike myself."* Across all three cohorts, 100% of participants reported that they would recommend the programme to a friend, reflecting the overwhelmingly positive reception of the residential.

To evaluate the programme's effectiveness, we collected mixed-method data (pre- and post-participation survey responses, focus groups, interviews, and quantitative data provided by university central services to map student progression and retention) with full ethical approval. Four key groups contributed evidence: WP students who participated in the residential; the project team and student advisory panel involved in co-creation; academic staff and student ambassadors who supported delivery; and external partners who contributed to key aspects of the programme. This multi-stakeholder dataset provided a robust foundation for identifying the programme's impact, limitations, and areas for development.

One of the strongest findings concerned the importance of transparency. Students responded positively to the clear and upfront communication about why they had been invited, and staff engagement improved markedly when departments understood the programme's purpose and their own role within it. Regular communication within the working group, and the use of a single departmental contact ensured alignment, and reduced duplication across the ten engineering departments involved.

The involvement of student ambassadors was a significant strength. Participants valued opportunities to ask senior students questions about university life that they might not have felt comfortable posing to staff; the ambassadors lived experience made their guidance particularly meaningful. The co-design approach was central to identifying student needs - such as prayer facilities, concerns about financial support, and clarity around bursary eligibility - which shaped both programme content and institutional improvements.

Equitable access also emerged as a key driver of engagement. Making all activities free of charge, coupled with travel bursaries and lunch vouchers, enabled students to participate fully without financial worry. Staying in student accommodation was especially impactful for students who would not otherwise have experienced halls, helping them to understand what to expect and feel more prepared for the start of term.

Cross-departmental collaboration enhanced both student and staff experience. Participants appreciated meeting peers from other engineering departments - *"I'm meeting lots of students from different departments and I probably wouldn't have the opportunity otherwise"* - and staff who delivered sessions reported that small-group interactions allowed them to better understand students' needs. This helped surface undisclosed or undiagnosed disabilities, financial challenges, and other concerns early, enabling timely referrals and support.

The timing and duration of the residential were viewed as appropriate by staff and students. A week-long schedule provided sufficient time for friendships and networks to develop, and the residential aspect was considered essential for establishing peer belonging. A strong variety of social activities supported this process, with students describing long-lasting friendships and ongoing support networks across cohorts.

Students frequently commented on the "genuineness" of the programme and the comfort of being surrounded by peers with different accents, characteristics, and personalities, noting that *"[the programme] had been made by people who knew what it was like to be in my position"*. The sense of shared experience helped students *"ease into the huge community that is Imperial"* and many continue to draw on these relationships as sources of academic, social, and emotional support.

Overall, the residential had a significant positive effect on participating students and staff and has contributed to a broader shift in Imperial's approach to supporting widening participation students during transition. As evidenced by the overwhelmingly positive feedback and strong engagement, the residential model offers a powerful mechanism for improving belonging, transition, and equity for widening participation students in Engineering. This feedback directly informed the decision to continue delivery within Engineering and, in 2025, adopt the residential model across the university.

7 CONCLUSIONS

Unlike many broad, institution-wide widening participation (WP) initiatives, this work is rooted in the specific disciplinary context of engineering, where challenges around retention, progression, and diversity remain particularly acute. The New Starters' Residential Programme was co-designed with students and delivered collaboratively across ten engineering departments and included engineering specific activities. Evaluation across three cohorts demonstrates measurable improvements in students' sense of belonging, academic confidence, and transition preparedness. Intersectional analysis of barriers offers educators a practical, inclusive framework for supporting WP students.

Our aim was to create a positive learning environment in which belonging could enhance students' persistence, academic development, and engagement. Although ambitious, the qualitative findings show that meaningful progress has been achieved. The programme provides evidence of the value of early, community-focused transitional support and serves as a replicable model for practitioners seeking to embed similar approaches within their own institutions. Learning gained across multiple iterations highlights the importance of asset-based design, student partnership, and equitable access for supporting underrepresented students.

A strong sense of belonging is known to improve academic persistence, wellbeing, and identity development [1]. We anticipate that this programme will continue to contribute to reducing attainment gaps, such as higher rates of re-sits and deferrals among WP students, by instilling this sense of belonging and fostering ownership over learning [7], [8]. Beyond strengthening belonging, the residential has enhanced cross-departmental collaboration and partnership with university services. These findings, alongside overwhelmingly positive student feedback, provide strong justification for the continued investment in and scaling of pre-arrival support for WP students within Engineering and across wider university networks using a co-creation approach [10].

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