



Diversity Edition
March 2019

LIVIT



Hello fellow Civil Engineers,

By now, I hope you know who I am but if not then let me introduce myself: my name's Laura and I'm the Departmental Wellbeing Rep. I'm in third year and you may find me roaming the halls of Skempton complaining about a load of meetings I have to attend. What I do hope, however, is that you know your year wellbeing reps who are: Ayo (Y1), Louise (Y2), Emily (Y3) and Sherif (Y4).

Diversity is an important part of all our time here at Imperial, and it's something I'm passionate about. While Diversity Week may not have gone exactly to plan, I hope this week's LIVIC is something that you enjoy. There are a great range of articles in there and my favourite is Leena's, the introducer of Cultural PPE.

Now, if you've ever felt at a disadvantage here in Civ Eng because of diversity don't hesitate to let me know. We have a duty to combat any bad culture the department may have and make it inclusive and welcoming.

So please, enjoy this week's LIVIC!

Laura

Diversity and Inclusivity: A civil engineering perspective

Professor O'Sullivan. *Chair of the Equality, Diversity and Departmental Culture*

Introduction

At the beginning of 2018 the Department of Civil and Environmental Engineering at Imperial College set up an Equality, Diversity and Departmental Culture (EDDC) committee comprising representative staff and students. This committee is part of the Department's Athena Swan Award action plan. An active dialogue on diversity and inclusivity developed within the Department during the preparation of the successful Athena Swan application in 2016-2017. At the same time Imperial College is placing a greater emphasis on embedding consideration of equality, diversity and inclusivity in all college activities.

These developments within the Department and Imperial College reflect growing acknowledgement of the importance of diversity and inclusivity by industry, society and key engineering institutions. Table 1 is a non-exhaustive list of recent, freely accessible publications that consider diversity and inclusivity from educational, engineering and business perspectives.

What do Equality, Diversity and Inclusivity mean?

Diversity is a measure of demographics; it considers similarities and difference in terms of age, gender, ethnicity, religion, sexual orientation, disability, educational background. Measures of diversity are typically numbers or proportions. Inclusivity relates to people's perception and experience of the culture in which they work or study. Equality is about recognising that everyone should have the opportunity to full their potential.

The Case for Diversity and Inclusivity

Ethical considerations drive most people to respect diversity and be consciously inclusive. It is the right thing to do from a fairness or social justice perspective. However, people are often reluctant to openly champion diversity and inclusivity reflecting a discomfort with promoting or forcing their value system on others. However, if students in this Department are aspiring to have an impact on the profession and take up leadership roles in the future, it is clear that they need to embrace these concepts to succeed at the highest level. Similarly the Department itself wants to attract talented staff and students to achieve excellence and so it is working foster a more inclusive environment.

There is a business case for diversity. The reports listed in Table 1 provide a significant evidence of the benefits diversity and inclusivity. For example, the research summarized in the reports by McKinsey shows that there is a clear link between diversity and business performance. McKinsey considered 1,000 companies in 12 countries and found that:

- Gender diversity is correlated with both profitability and value creation. For their dataset, companies in the top-quartile for gender diversity on executive teams are 21% more likely to outperform on profitability than other companies.
- Ethnic/cultural diversity in management teams is correlated with profitability. Companies in the top-quartile for ethnic/cultural diversity on executive teams are 33% more likely to have industry-leading profitability.
- Companies in the bottom quartile for both gender and ethnic/ cultural diversity were 29% less likely to achieve above-average profitability than were all other companies in their data set

The 2013 study by Deloitte revealed that employees who think their organisation supports diversity and who feel included perform better (Deloitte quantified an 83% uplift); there is better team collaboration (42% uplift).

From an engineering perspective, our central role is to provide design solutions to problems. A successful product or service is more likely to meet the needs of a diverse set of consumers or users if the design team itself is diverse. McKinsey's report finds that diversity and inclusivity improves the quality of decision making. Imperial College's 2018 strategy on diversity and inclusivity recognizes that creativity is enhanced when people readily engage with new ideas and viewpoints that challenge groupthink. Research by the Royal Academy of Engineering has found that amongst engineers 80% report that feeling included in their organization increases motivation, 68% report it increases performance and 52% indicate it leads to an increased commitment to their organisation. The Royal Academy of Engineering also found included engineers are more likely to understand business priorities and are more confident about speaking up (e.g. about improvements or mistakes, including health and safety violations).

At a national level the engineering skills shortage can partially be addressed if people from a more diverse range of backgrounds can be attracted to engineering.

Room for Improvement?

The general statistics on diversity in business and engineering are not great. According to the 2017 report from the Chartered Management Institute, while around 12.5% of the UK population are from BAME (black, Asian and minority ethnic) backgrounds, only 6% of top management positions are held by people identifying as BAME. The Chartered Management Institute also noted that only 54% of senior business leaders champion diversity. The Royal Academic of Engineering 2017 report found that in the UK 92% of engineers are men, 6% of engineers are BAME, compared to 14% of the UK population, and people with disabilities comprise less than 5% of the engineering workforce, compared to 17% of the UK population.

Creating an Inclusive Environment

The Royal Academic of Engineering identified 7 measures of inclusivity considering engineers in the workplace: (i) can people be open about themselves and their life outside work? (ii) do people feel they are treated with respect? (iii) are relationships friendly, collaborative, free of offensive banter, bullying or harassment? (iv) are staff supported in their career development and do they feel the promotion process to be fair? (v) are staff to work flexibly while advancing their careers? (vi) do engineers believe their managers are committed to diversity and inclusion and (vii) Is there a diverse range of people in the organization? While these definitions are very much focussed on the workplace is not so difficult to transfer them to, or find equivalent measures for, a university environment.

Different groups have different experiences of diversity. The work by the Royal Academy of Engineering has shown that white male engineers feel that the culture of engineering is more inclusive than female engineers who in turn feel that it is more inclusive than engineers from BAME backgrounds.

Diversity and Inclusivity at Imperial College

In October 2017 Imperial College appointed a new Assistant Provost for Equality, Diversity and Inclusion (Prof. Stephen Curry). In October 2018 Imperial College launched its new strategy document on equality, diversity and inclusion called “Inclusive Excellence”. These activities have improved awareness of equality, diversity and inclusivity at a college level.

Imperial College’s new strategy document indicates the need to recruit from a broader pool of potential talent to achieve high quality research and education. Imperial College is now actively engaging with externally accredited schemes including the Athena SWAN awards, the Race Equality Charter, the Stonewall Workplace Equality Index, and it is a Disability Confident Employer.

Diversity and Inclusivity in the Civil Engineering Profession

The Civil Engineering profession in the UK recognizes the importance of diversity and inclusivity. The Institution of Civil Engineers launched its Diversity and Inclusivity Action Plan in 2016. Representatives from Mott MacDonald, Atkins and Network Rail contributed to the Royal Academy of Engineering’s 2017 Report, each providing examples of steps they have taken to improve inclusivity in their organization. Table 2 indicates that a number of large civil engineering employers advertise their inclusivity and diversity policies via their webpages.

Diversity and Inclusivity within the Department of Civil and Environmental Engineering

The Department of Civil and Environmental Engineering is proud of the diversity of our staff and student body. Over 51 countries are represented in the Department, making it international and culturally diverse. A significant effort to assess gender diversity and inclusivity in the Department was made in 2016-2017 by the Athena Swan Self Assessment Team lead by Professor Richard Jardine. The assessment considered how the Department supports female engineers from their initial recruitment as first year undergraduates to their promotion to full professor. The process also involved an extensive data analysis which revealed that we have reasonable representation of females amongst our staff and student bodies, when compared with the average data for civil engineering departments in the UK. However, female engineers make up only 30%-40% of our students and academic staff.

In an inclusive environment people treat each other with respect. Active Bystander training shows people strategies they can use when they encounter poor behaviour in professional, educational and social settings at the College. In 2018 the Department held Active Bystander Training for staff and postgraduate students. This training was also provided to all incoming first year students in October 2018. By running this training within the Department, we aim to get people talking about expectations of behaviour.

Biases hinder the development of diverse communities. Unconscious bias training explores the nature and consequences of unconscious bias and enables participants to identify possible biases in themselves. The Department of Civil and Environmental Engineering now offers unconscious bias training to all first year students. All staff are expected to complete unconscious bias training and the Department will run special sessions for staff and PhD students in the first half of 2018.

Conclusion

Most of us understand that developing diverse communities of students or employees who feel included is the right thing to do. However looking beyond ethical issues, there are key strategic drivers. Whether considering a undergraduate coursework assignment, an innovative research project or the delivery of large civil engineering infrastructure, a diverse team which is consciously inclusive is likely to outperform its competitors. The available data indicate correlations between a diverse, inclusive environment and increased profitability, innovative solutions, and greater engagement amongst staff.

The Equality, Diversity and Departmental Culture committee aims to improve the inclusivity of the Department of Civil and Environmental Engineering. I chair this committee. Any suggestions for activities or topics this committee should consider are welcome. Students are represented by the CivSoc chair, Hippolyte Mounier-Vehier, and the well-being representative, Laura Nagib, and they can either approach Hippolyte and/or Laura or contact me directly (Skempton building room 501 or cath.osullivan@imperial.ac.uk).

The logo for Imperial College London, featuring the text "Imperial College London" in white, bold, sans-serif font, centered on a dark blue rectangular background.

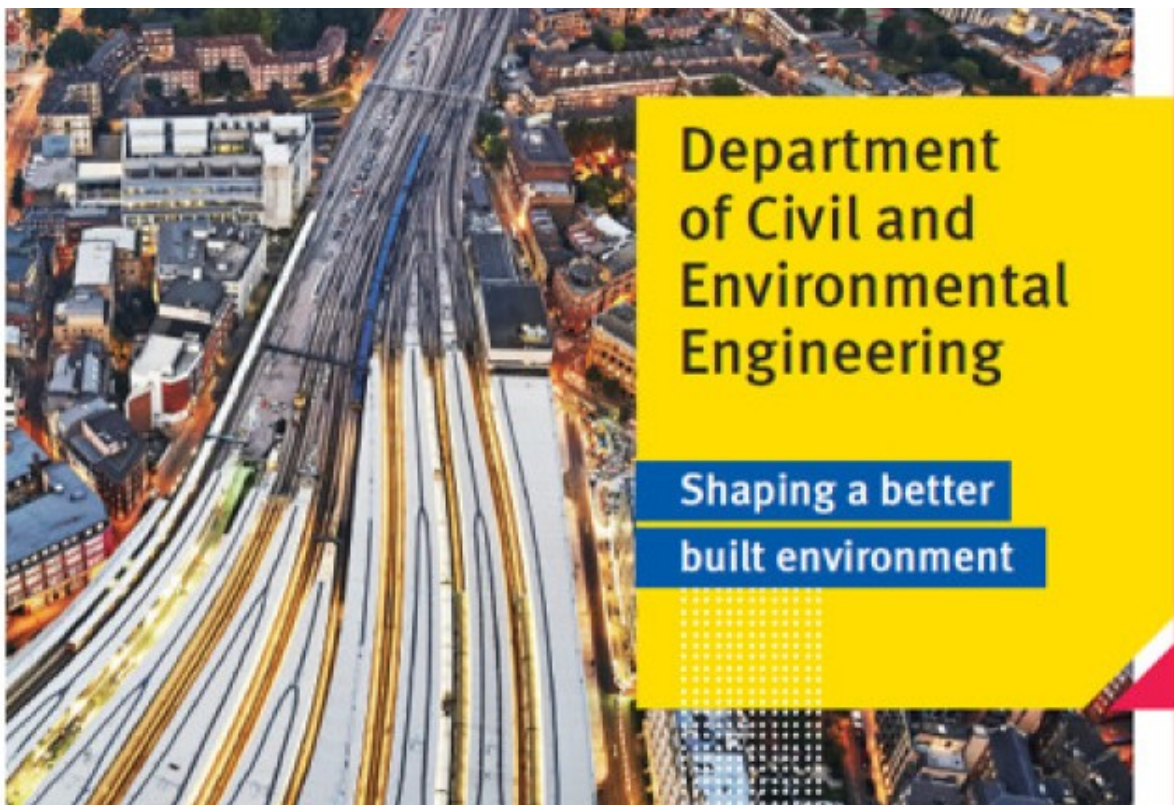
**Imperial College
London**

Table 1: Recent Reports on Diversity and Inclusivity

Institution / Body	Report title	Date of publication
Institution of Civil Engineers	ICE Diversity and Inclusivity Action Plan	Early 2016
Royal Academy of Engineering	Creating cultures where all engineers thrive	Sept. 2017
Royal Academy of Engineering	Improving employment opportunities for diverse	June 2018
Royal Academy of Engineering	Designing inclusion into engineering education	July 2018
Royal Academy of Engineering	Diversity and inclusion in engineering measurement	Oct 2018
Ernest and Young	Diversity - is it good for business?	2017
Imperial College London	Inclusive Excellence: Equality, Diversity and Inclusion Strategy.	Oct 2018
McKinsey & Company	Delivering through Diversity	Jan 2018
McKinsey & Company	Women in the Workplace	2018
Chartered Institute of Management	Delivering Diversity	July 2017
Deloitte	Waiter is that Inclusion in my Soup?	May 2013

Table 2 Listing of Equality, Diversity and Inclusion WebPages from Representative Civil Engineering Employers

Company	Title of Diversity Page
Amey	Inclusion and Diversity
ARUP	Diversity and Inclusion
Skanska	Diversity and inclusion
Laing O'Rourke	Equality, diversity & inclusion policy
Atkins	Diversity
Mott McDonald	Equality, Diversity and Inclusion



Diversity – LGBT+ perspective



Dominic Cronin, *Graduate Civil Engineer*

Diversity Ambassador for ICE London Graduates & Students Committee

In the past decade, there has been an increase in focus on improving Diversity and Inclusion within the engineering industry. Diversity and Inclusion covers all characteristics covering, but not restricted to, sexuality, race, social mobility and neurodiversity.

When starting in August 2018 as a graduate with BWB Consulting, as graduate last year, my sexuality was not taken into consideration – especially as I mentioned that one of my part time hobbies was competing as a drag queen in the interview process!

My worry of discrimination flew out of my head and I was able to focus on my work. You will find that in the Civil Engineering industry, despite being very male and heterosexual dominated, it's a very welcoming environment.

As part of a study by Kier's LGBT+ and Allies Network and WSP's LGBT+ network, they found that close to none was uncomfortable with someone's sexuality, if the work was done that was what mattered. However, there were some health and safety concerns on constructions sites, where homophobia may still be relevant, that workers may be unable to focus due to a LGBT+ workers mental health and wellbeing.

As part of the yearly diversity conference, this year named "Data-driven culture change", the Royal Academy of Engineering have been showing their findings as part of their Strategic plan for 2015-2020.

One of the main findings is that currently for the UK to advance within engineering "1.2 million more engineers and technicians are needed between 2014 and 2024". However, there is a shortfall of 37,000 and 59,000 graduates and technicians respectively each year.

One of the main benefits outlined was that it would improve productivity in a workplace, which is a benefit that would affect us the most personally, as this involves targeting us as people and improving our work conditions. LGBT+ engineers productivity decrease when in a homophobic environment or an environment where they cannot feel comfortable. Dr. Mark McBride-Wright's study showed that homophobia within the work place costs a potential £11.2 billion due to a 30% reduction in productivity. Many LGBT+ engineers remain closeted due to a lack of visibility.

Especially as 46% of LGBT+ workers are closeted at work and 62% of graduates go back into the closet after they graduate, as shown by the human rights campaign.

Out to Succeed survey shows that the Engineering and Construction industry is in the top 4 sectors that LGBT+ people wish not to work in. The most conventional route to enter the engineering industry is via university and picking the correct A-levels, so this suggest that LGBT+ students at their GCSE/A-level may not find the Civil Engineering world appealing.

If you are interested in improving Diversity and Inclusion in the Civil Engineering industry or just in general, as a student there are a few things that you are able to do:

- Start as a STEM ambassador; become a role model and run activities that inspiring younger students continue their education in STEM or help younger students with interview's and cover letters. A great early start to your civil engineering career.
- Look out for Diversity and Inclusion Panels/Webinars/Articles. Read the references below to get you started.
- Join an LGBT+ engineering organisations, such as InterEngineering and participate in London Pride.
- Partake in Women in Engineering events, with the International day coming in 23rd June.
- Join the ICE Graduates and Students Committee, we have monthly meetings every first Tuesday at Price & Myers – look out for meetings on the ICE website.

Anyway, the main thing is that you should continuing to focus on becoming a Civil Engineering, without your sexuality/race/neurodiversity being an issue for close minded companies.

Good luck!

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Eneritz Ochoa

Tunnel Shift engineer

My name is Eneritz Ochoa, and I am a civil engineer from Spain who has been working in the construction industry in the UK for 6 years.

My first role was as a Tunnel Shift engineer, working on the Crossrail project based out of Farringdon station. I worked in several other roles on the Crossrail project, progressing to Section Engineer which is my current role on the Tideway project (West).

Throughout these 6 years I have seen a significant change with regards to diversity in the construction industry's workforce. When I started my career, I was the only female engineer within the tunnelling team. I've recently worked in teams where almost 50% of the team were made up of women. The roles they perform range from designers, management as well as engineers, although not usually site-based.

This has been facilitated by the focus on diversity from the biggest names in engineering and construction, working to improve inclusivity, for example through re-designing protective clothing with consideration for women and faiths, improved recruitment procedures, and simply reporting on diversity and inclusivity.

The same way it has been inspirational for me to see female Project Directors, this shift in attitude is an important step in giving young people role models and career paths to aspire to. Breaking stereotypes in this way will in turn attract talent and further drive innovation, essential for a city that is constantly improving its infrastructure.



Leena, the Lady behind Cultural PPE:

Leena Begum, *Morgan Sindall Construction & Infrastructure*. **Trainee Health and Safety Advisor**

Leena, a trainee health and safety advisor agreed to give LIVIC an interview about her experience in the construction environment and how she is helping make it more welcoming to an increasingly diverse workforce.

Leena has worked on various projects for Morgan Sindall Construction & Infrastructure over the last few years, including Crossrail, Tideway and currently Barking Riverside Overground extension, but it was on her first project when she realised that the PPE available did not comply with her religious beliefs as a Muslim. However, as an apprentice, she felt unable to raise the issue so tried to avoid the problem by working in the office and avoiding site visits. She was faced with a question: Should she compromise her religious values, or should she respect them and potentially compromise her career? Despite her initial apprehension about the construction industry, Leena started to thoroughly enjoy it. "I can see myself doing this!" she recalls thinking after being amazed by the tunnelling site.

After a few months, Leena had to go on site and in order to comply with her religious beliefs she decided to wear multiple layers of clothing under a men's bomber jacket in order to have enough clothing length, despite the warm weather: "I had never worn something like this before, this was embarrassing". With this PPE on she only managed to make it to the site office before fainting as she overheated under the numerous layers. When the safety team asked her about the incident, she still didn't feel comfortable to explain the truth.

Following this incident, Leena felt she had to make a decision either to stay away from site, or to compromise her beliefs and wear the standard PPE. She chose the latter option: "It was a shame because wearing this PPE was inadequate with my values, my beliefs." She felt as if she had two moralities: one she obeyed off-site following her personal beliefs and one she obeyed on site. Leena didn't feel comfortable with this situation and reflected that if an issue is so important for an employee, it should be important for their employer.

With this in mind, Leena continued her engineering adventures, moving on to the Tideway project where she met another female Muslim engineer experiencing the same problem. This other employee refused to compromise her beliefs and went on site wearing her long dress and an Hi-Vis jacket to start her walk-around. As part of the safety team, Leena realised that this was an issue that had to be tackled.

But what to do? It was then that Leena realised that someone needed to create special PPE for female Muslims. Once she had presented her story to the Health and Safety director at her company, he was supportive and enthusiastic about the project. He quickly understood the benefit that this new PPE would bring to the workforce and helped Leena push the idea forward and receive the recognition she deserved for her bold idea. As Leena puts it: "I knew it would bring some benefits, not just to me but to others." She then designed the first draft of Cultural PPE using shapes from Microsoft Word, the first iteration of "Modress" coming from combining modest and dress.

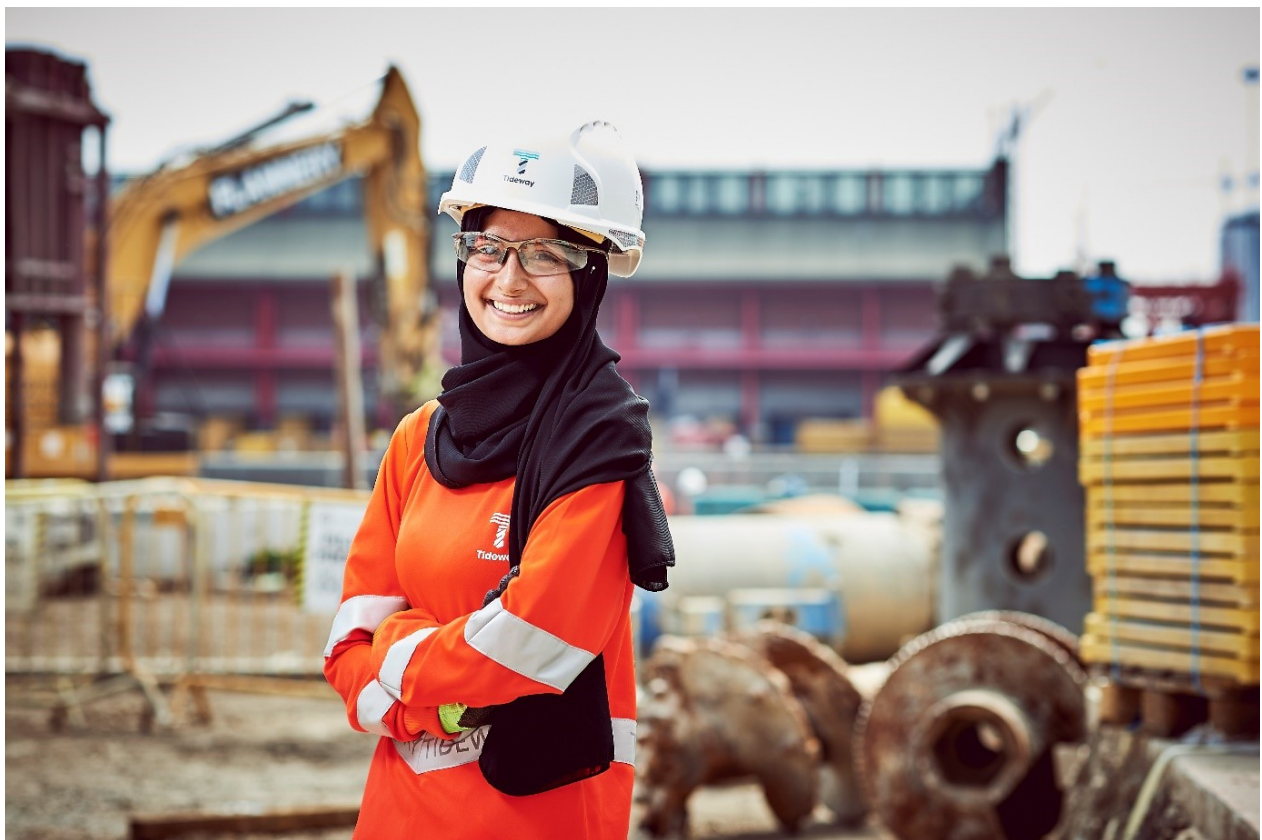
As the project progressed, it became evident that the idea was gaining interest, but in order to make the drawing a real piece of equipment, funding was necessary. That's how, at age 21, Leena managed to convince the project's customer to set a budget of £8,000 in order to develop not only PPE for female Muslims but also PPE for pregnant women, who had also found the standard PPE unsuitable.

With the money in the bank, the company contacted a PPE distributor, and convinced them that the idea was a no-brainer. This success was a large step forward in achieving a more diverse construction workforce. Cultural PPE has now been on the market for around 2 years, and allows female Muslims to be both comfortable on site and develop their careers whilst adhering to their beliefs.

As Leena recounts, when employees now enquire about Cultural PPE, colleagues know what they are talking about, and no questions are asked. The image of a Muslim woman on site gives younger women the message that construction is welcoming them. At outreach events, the image of a woman wearing a headscarf on site put smiles on the faces of Muslim school children: “It is someone they can relate to.”

In order to sell her idea, Leena pitches “Construction is all about problem solving: to get solutions, we need a more diverse workforce.” An example of this has been shown before by the NHS, which has one of the most diverse workforces in the country and has been providing culturally sensitive clothing to its staff for some time now. “Suitable PPE makes a construction site feel welcoming and inclusive.”

I personally would like to thank Leena for her time and her kindness in helping us write this edition and also on making the construction industry more diverse.



Leena Begum, 2018

DIVERSITY.

Ms Alison Ahearn, Principal Teaching Fellow

There are many ways to look at “diversity” at Imperial. I am a lawyer teaching engineers which seems a surprising combination to some people but it is logical when you remember that the construction industry has so many legal disputes that it has its own court of law (the Technology and Construction Court: the TCC). When I think of diversity, at Imperial, I view it in many ways. I can think of the diversity of having personal tutees who have allowed me to see inside the lives of people very different from me, whether they are mathematical (which, by Imperial’s standards, I am not) or they are from wealthy background (which I am not) or they are from a tiny village in Wales (I am from an industrial town) or they are into fashion beauty pageants and modelling whilst studying civil engineering (which was a bit of a surprise). I had a tutee who had a physical disability which affected her mobility but it turned out that the force of her personality was so strong that most students failed to notice her “floppy feet” and only saw her as a leader (and a party animal, of the good type). The other students were so oblivious to her physical limitations that when, at Constructionarium field course, I drove her around the big Norfolk campus because she struggled to walk in the heavy workboots, other students complained that I was giving favours to my tutee. She explained her feet problem to the students but they just could not pin the ‘disabled’ label to her: this also gave me insight into the power/disempowerment of being labelled as having different needs.

Imperial shows me that there are many ways to be diverse. There was the time we did Night of Engineering Philosophy and I found out that one of the students had started at RADA and then switched to Imperial: to her, that was an easy switch. To me it was like an alien from drama school landing on a different civils planet. Or there was the diversity of overhearing a tea-break conversation, during Constructionarium, between the head of the Millau Viaduct team and his power tools guy about Mozart’s use of the “minor third interval” in the falling cadences at the beginning of the Mozart 40th Symphony in G Minor: unlike the fashion/engineering or drama/engineering combination, I have no trouble seeing how the mathematical precision of music and its careful construction is quite inspiring to anyone involved in structural engineering. But, upon reflection, I can see that fashion requires creative design and fine craftsmanship and is a huge business sector: likewise drama in this land of Shakespeare and Curtis. Creative industries have real things in common with engineering. So the diverse people you encounter, here at Imperial, makes me loosen up my ideas.

There was the time when I tried out my “Chinese language” skills on some students who did manage to recognise the chorus of the song I was singing, but then had to explain to me that I was singing Cantonese, not Mandarin (My friend from home had just said it was “Chinese”). That was back around the time that the Humanities Dept (as then was) said that the most popular language to be studied by students was ‘no longer French and German but Mandarin for Speakers of Cantonese’. They then had to explain to me that Cantonese speakers can read Mandarin and understand the same meaning that the Mandarin speaker understands, but if it is spoken, the sounds made by the two speakers are very different and incomprehension can follow. That was a point at which I knew the world had changed, because when I was at university, the only Mandarin speakers I ever met were older refugees from the dangerous times of the Cold War and Vietnam War when China was seriously not open to the West. The world is much more fun with China having a more open-door policy.

Because I used to supervise final year projects which were on topics of engineering management, I also had the fun of having students asking to do projects about engineering management in their home country: they gave me new eyes for other countries. So I have learned about the way Chinese firms build business relationships through mutual social obligations; I have learned about the introduction of BIM in the Middle East (they looked at what the Brits were doing, then implemented it faster); I have learned (from my students) about the Greek efforts to improve engineering regulation (law) in earthquake zones; and I was fascinated by the management obstacles of a consortium who used to do maintenance for London Underground. My student correctly predicted that the consortium could not survive (it duly went bankrupt). Students who went to Rwanda to build energy schemes came back and discussed their qualms about how they enforced their child labour policy (they refused to employ kids, but this meant fathers came to work on the energy scheme and the kids went to work on the farm, doing even harder work: what was the ethical right answer?). Or there was the El Salvador project students who came to discuss their distress at having had to choose which families would get help (the disappointment, of those who missed out, was expressed as hostility). Doing good can feel like doing harm, if you do not understand the local context. To appreciate context, you must appreciate diversity and the possibility of division and the scope for unity.

On a different level, the diversity of Imperial means that, in January this year, I have spent time in Israel with someone who did her PhD at Imperial in the 90s. I spent time at ETH Zurich meeting up with a professor from Brazil whom I knew when he did his PhD at Imperial. In February, I hosted a visit from a Romanian academic who teaches in France but who was at Imperial on secondment for two years, learning about how we teach data science. As a kid, I went to school in a “New World” country where the kids of the former WW2 enemies all sat together in school. My father fought in WW2 but my English teacher was German and my Maths teacher was Italian and...we never thought about them as former enemies (but they did do very dark humour about WW2). We were all ‘Australian’ and everyone cultivated the same accent (it may not be a pretty accent, but it gives everyone something identifiably held in common). At Imperial, people do not have the same spoken accent but they do share a curiosity and a liking for knowing stuff and doing stuff: it is a shared intellectual accent. Are there issues and problems to be overcome on diversity ‘issues’ at Imperial? Yes. Are they important? Yes. But are there benefits and fruits of diversity that we already enjoy at Imperial? Yes and yes and yes.



Hello Civil-Engineers-to-be!

I am Mohamad Dib, Chair of Global Brigades society at Imperial College.

Global Brigades is a non-profit organization that encourages university students all over the world to engage in

projects in Central America during 7-10 day brigades. These projects range from meeting communities' medical and dental needs to installing in-home sanitation facilities and clean water systems. This Holistic Approach was adopted by Global Brigades in order to empower communities and help them permanently rise out of poverty.



Imperial College Global Brigades society is planning an 8-day brigade to Honduras this summer. This brigade will cover two aspects of community development: *Water and Public Health*. To provide a clean water supply network within the community, volunteers will work on setting up

filtration systems, digging trenches and installing pipelines to connect houses to a source storage tank. Once set-up, Global Brigade sustainable development fund ensures that this water system is monitored and maintained by members of the community. The brigade will also include one day dedicated to educate the community members about the importance of clean water access and how to benefit from it (hygiene habits, water conservation...). After this, the volunteers will go on to develop the community's overall public health by constructing sanitation stations with latrines and showers, to provide for families a clean environment and reduce chances of disease.

It was truly a great experience I had the chance of going through last summer! It built me in many ways and is very rewarding for both you and the communities in Honduras!

Thank you, and to learn how to sign up, drop a message on our Facebook page (Global Brigades Imperial).





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