


“Breaking the professional barrier and collaborative working within STEM area”



Jennifer Hardi BSc Hons. MPhil PGCHE SFHEA MCIOB MCIAT

London South Bank University
Faculty of Engineering, Science and the Built Environment



A little bit about myself

Architectural Technologist and Engineer by background

Research: Building Information Modelling, pedagogy,
collaborative working, sustainability, architecture

STEM Ambassador





Our University



Strategy at a glance

Key outcomes 2015–2020

Student success

Ensuring we are externally recognised for providing a personalised, high calibre education which equips graduates for employment and prepares them to make a positive contribution to society.

Real world impact

Ensuring we provide dynamic evidence-based education which is underpinned by highly applied research and enterprise activity.

Access to opportunity

Building opportunity through partnership: ensuring we are actively widening participation, engaging with our communities and a partner of choice.

Strategic enablers

Ensuring we have the right resources, systems and infrastructure to deliver the strategy.

Our University



The Times Higher Education Awards are widely regarded as the Oscars of the higher education sector, shining a spotlight on the outstanding achievements of institutions, teams and individuals working in higher education across the UK. In 2014/15 LSBU supported 600 local SMEs, boosting growth and creating jobs. Enterprise activities offered by the [Student Enterprise](#) team have engaged over 10,000 students and staff, and supported 220 student and graduate business ideas this year.

Join the number



No.1 London Modern University for graduate prospects

Sunday Times League Table 2017

Apply now through Clearing >>

LSBU awarded silver! Teaching excellence award

LSBU praised for focus on personalised learning >>



Our University



Established in 1892

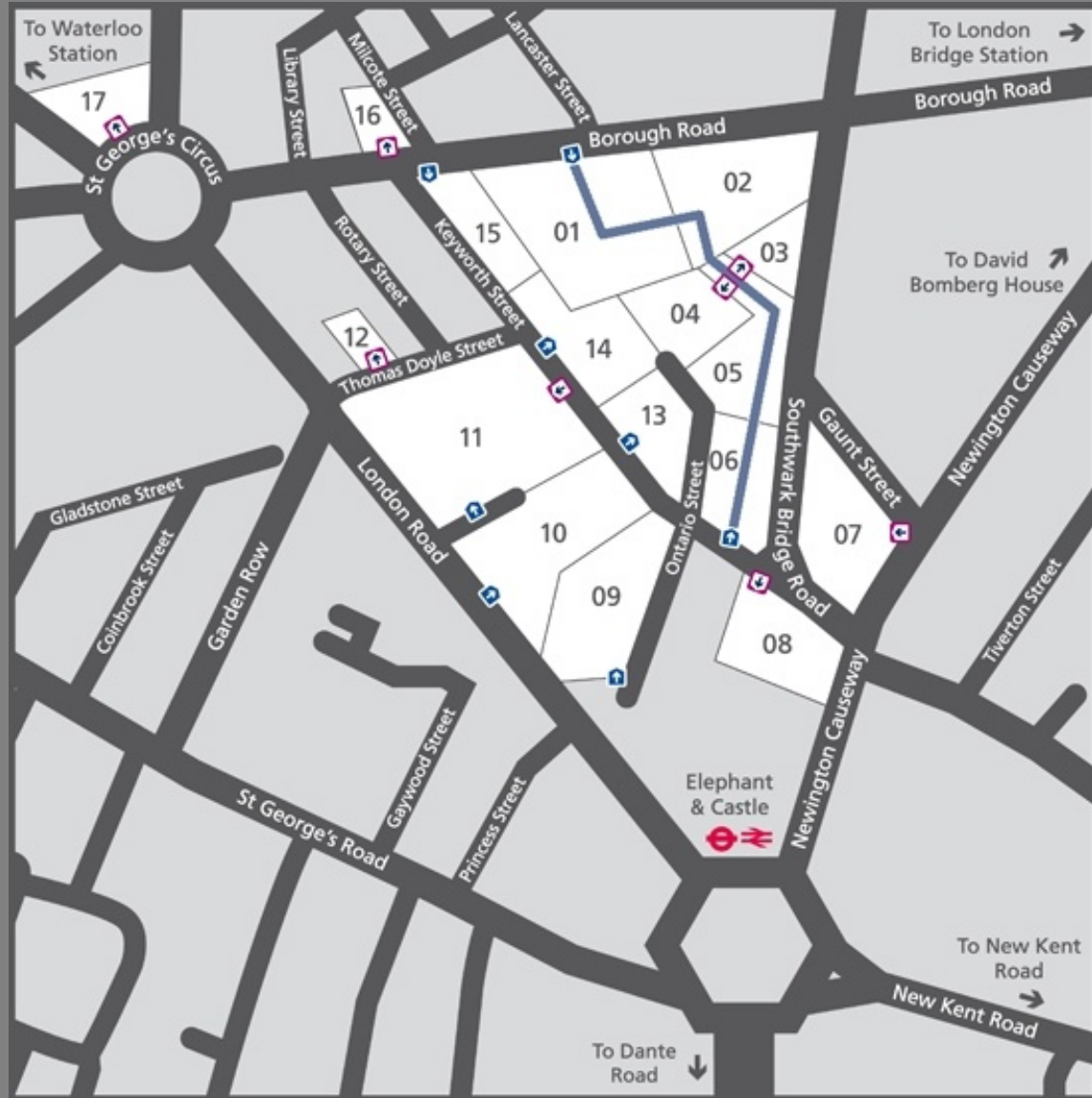
To provide students with relevant and practical employment skills to support local employers

- Over 25,000 students

Current Schools:

- **School of Built Environment and Architecture**
- School of Applied Science
- School of Engineering
- School of Business
- School of Law and Social Sciences

Campus Map



- | | | |
|-----------------|------------------------------------|---|
| 01 Borough Road | 08 Perry Library | 15 Learning Resources Centre |
| 02 Tower Block | 09 Admissions & Recruitment Centre | 16 Caxton House |
| 03 M Block | 10 South Bank Technopark | 17 McLaren House |
| 04 J Block | 11 London Road | building entrance |
| 05 E Block | 12 Students' Union | accessible entrance |
| 06 Faraday Wing | 13 Keyworth Centre | internal walkway on Level 1 (Green Route) |
| 07 Eileen House | 14 K2 | |

Choose the course that's right for you

Choose the course that's right for you

We've put together this handy FAQ for our Architecture, Architectural Engineering and Architectural Technology programmes to help you pick the course that suits you best, and most closely matches up to your career expectations.

	BA (Hons) Architecture	BSc (Hons) Architectural Engineering	BSc (Hons) Architectural Technology
What's it all about?	Design, and how this fits within the broader context of society.	Engineering aspects of buildings - their structural systems.	Technical aspects of design and building functionality.
Who is the course for?	Creative people with strong art and design skills who are interested specifically in building.	Mathematically-minded and scientific people who are interested in building physics, the construction process, and design.	Practical people with good problem-solving and communication skills who are drawn to science, technology, and sustainability and who are passionate about buildings.
What are the entry requirements?	120-128 UCAS points <u>plus</u> a portfolio of work A Level: BBC International Baccalaureate: 25	88-96 UCAS points A Level: CCD including Maths and Physics International Baccalaureate: 24	96-112 UCAS points A Level: CCC International Baccalaureate: 24
What if English is my second language?	IELTS score of 6.0 or Cambridge Proficiency or Advanced Grade C.	IELTS score of 6.0 or Cambridge Proficiency or Advanced Grade C.	IELTS score of 6.0 or Cambridge Proficiency or Advanced Grade C.
What will I study?	<ul style="list-style-type: none"> • Design and making skills • History of architecture • Architectural theory • Structures • Materials • Sustainability • Ethics • Communication skills 	<ul style="list-style-type: none"> • Architectural sustainable building design and technology • Building Information Modelling (BIM) • 3D Computer Aided Design and visualisation • Structural building analysis • Calculus • Building physics • Thermodynamics 	<ul style="list-style-type: none"> • Architectural sustainable building design and technology • Building Information Modelling (BIM) • 3D Computer Aided Design and visualisation • Project and contract management • Construction technology, structures and materials • Architecture theory and conservation • Architectural practice management • Building inspection and maintenance

Current Challenges in the Construction Industry and STEM

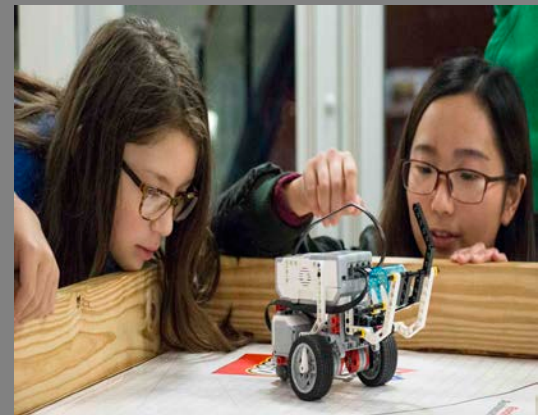
According to a Women into Science and Engineering survey from 2017, only 11% of the engineering workforce is female. The report **Engineering UK 2017** highlights that 265,000 skilled entrants are required annually to meet demand for engineering enterprises up to 2024. It is worth considering if this target is realistic given that the sector struggles with skills shortages and has an 89% male workforce.

Current Challenges in the Construction Industry and STEM

Traditionally, engineering- and construction-related careers have been promoted to males more than females.

As such, the average construction site has a macho culture, which some women find off-putting. The stereotype of the typical construction site worker also means that some women think they are not physically able to take on engineering-related tasks.

Men prefer to work with things whereas women prefer working with people/humanitarian/care-orientated field/something contribute to the better of other people/planet.



Current Challenges in the Construction Industry and STEM

The pay disparity between men and women presents a barrier to attracting and retaining the industry's female workforce. According to the Office for National Statistics, the pay gap between men and women working in construction stands at 45.4% – women are paid an average hourly rate of £8.04 compared with £14.74 for men.



Current Challenges in the Construction Industry and STEM

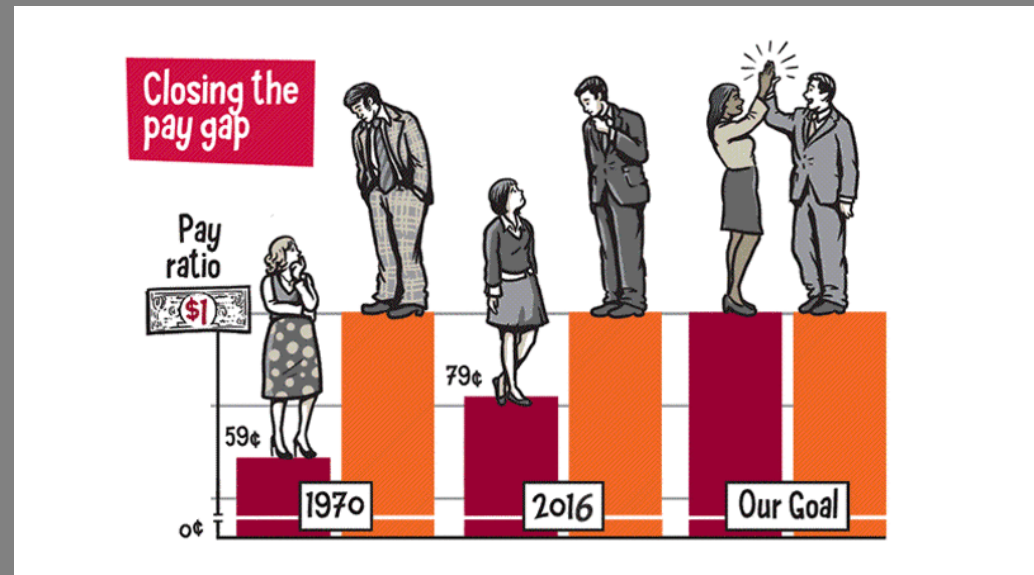
Many women drop out of engineering- and construction-related careers as a result of the issues mentioned. In addition, some women find it difficult to re-enter the industry after having children or a career break.

While extreme sex discrimination is no longer a widespread issue, there remains a culture of undermining the decisions and competencies of women in engineering and construction. Many women believe they have to shout louder to be heard. Some women have also commented on 'benevolent sexism', which makes them feel awkward working in a male-dominated environment.

Current Challenges in the Construction Industry and STEM

Research defines that the point where the career path starts to diverge before 15 years old. It's reported that at that age, boys are more than twice as likely as girls to expect to work as scientists or engineers.

Less than 0.5% of girls would like to be working in the ICT sector, while the percentage increases to 5% of boys.



Factors relating to gender diversity and biasness

- Challenges faced at different age stages
 - Gender roles, patterns and stereotypes deeply installed in family and society about what careers are appropriate for both men and women have an impact on the future education of those boys and girls and their career choices
- Potential solutions to reduce the gender gap:
 - Include more mixed group of boys and girls
 - Examples of children playing without stereotype, so not to use 'all girl' or 'all boy' scenarios
 - Use colours without stereotype

Factors relating to gender diversity and biasness

- Potential solutions from the professional age window:
 - Companies and institutions would benefit from adopting gender equality plans that is structured along the main axes of increasing the visibility of women in the technology field, promoting equal parenting, establishing flexible work arrangements, and reducing the gender wage gap
 - Don't focus only on short term plan (increasing the number of women into the workforce) but on **long term** criteria to include consideration of merits and qualification and build a welcoming environment with support for women to achieve a long-term change in the diversity gap.

Factors relating to gender diversity and biasness

- In Higher Education institutions context, actions related to gender equality need to integrate male students to avoid frustrated feelings in them, especially if they perceive that the female students are accessing exclusive resources.



Factors relating to gender diversity and biasness

- Challenges faced in a (fe)male predominant environment
 - Construction Industry and STEM has been (still is) traditionally a male-predominant environment.
 - Reason: lack of visibility of women already working in the topic which discourage other women to enter the field and hence decreases the percentage of women, which reduces their support network and cause workplace displace dissatisfaction to arise in the end.



The Way Forward

STEM field currently is seen as not achieving communal opportunities to work or help others.

Research also suggests that without **women's empowerment**, **women** wouldn't feel equally **important** to the process of **development** as men.

It is therefore widely believed that, the full participation of **both** men and **women** is critical for **development**.

Gender diversity has been proved to increase the potential of innovation. In fact, defining teams with an equivalent composition in terms of woman and men translates into increasing the creativity, the chances to experiment, the share of knowledge, and task fulfilment with respect to building teams with other compositions.

A larger number of women in the teams can also be related to higher levels of collective intelligence.

The Way Forward – the Interventions

- Providing Institutional Encouragement and Support
 - Promoting interaction with high school students through workshops and seminars
 - Promoting interaction between female faculty members and University students
- Increase the professional support network
 - Promoting interaction with professional women working in STEM environments
 - Building female/male student support networks
- Promoting and supporting the Leadership
 - Increase presence of women in high-rank academic positions, addressing the vertical segregation
- Increase the visibility of female role models
 - Recognise and disseminate the achievements of women in STEM fields.
 - Giving awards to female students with outstanding final degree projects

Raising awareness of female in technology and engineering within the construction industry

Starting from the early age

Aim at primary and secondary school female students



Female/Male Scientists Role Model Week



Edith Clarke:
Electrical Engineer



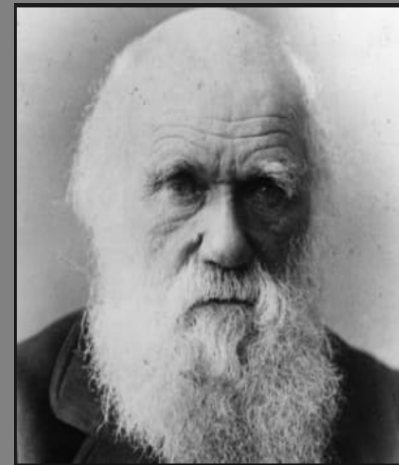
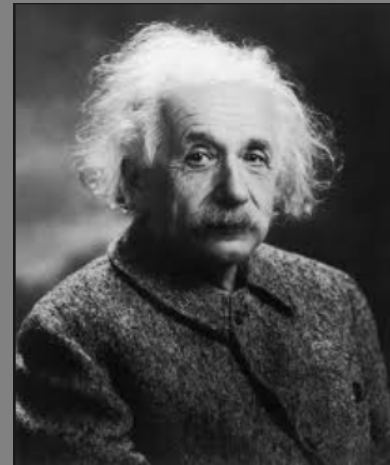
Olive Dennis:
engineer whose
innovation
changed the
nature of railway
travel



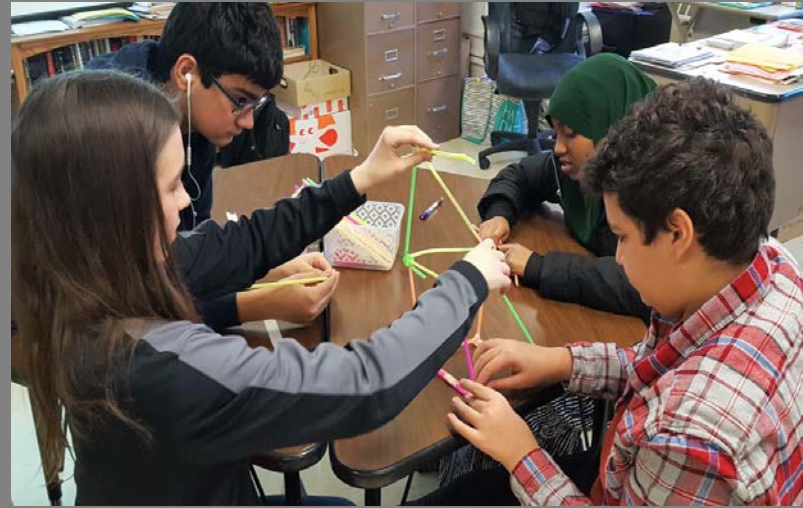
Zaha Hadid Architect



Marie Curie:
Physicist and
Chemist



Teambuilding Exercise



STEM Ambassador



- Working with construction companies, schools and innovation parks and arrange for school site visits to encourage awareness of sustainable building, materials engineering, etc

Work Shadowing

- Aim at students in college/high schools when they are about to decide their career path.
- Working over the summer period
- Allow them to understand the various roles and disciplines within the construction industry with emphasis on STEM area within the construction industry.



Women in Science and Engineering Day

- lead by female academics, engineers and current students
- Outline the excitement and benefits a career in engineering can lead to.
- all-female panel of experts discussing their journey through their professional lives: how they achieved their goals, challenged stereotypes and created a new environment for female professionals in their fields.



Raising awareness and assisting in retention of female students in University/Higher Education

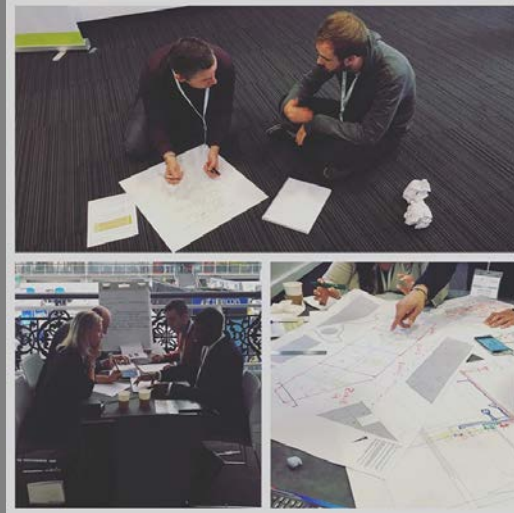
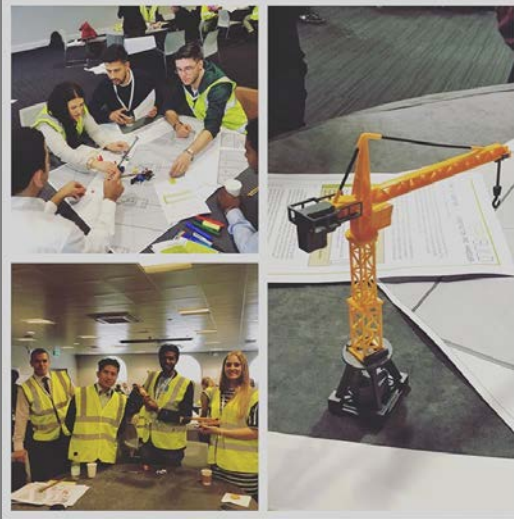


Women in Property, Construction, Technology and Engineering Award

- Competition aim at female students on first/second year of their study within UK
- Mentoring led by women engineer, architects and other professions in the industry
- Mentoring female students in higher education on interview, presentation, communication and leadership skills
- Award include internship in the industry

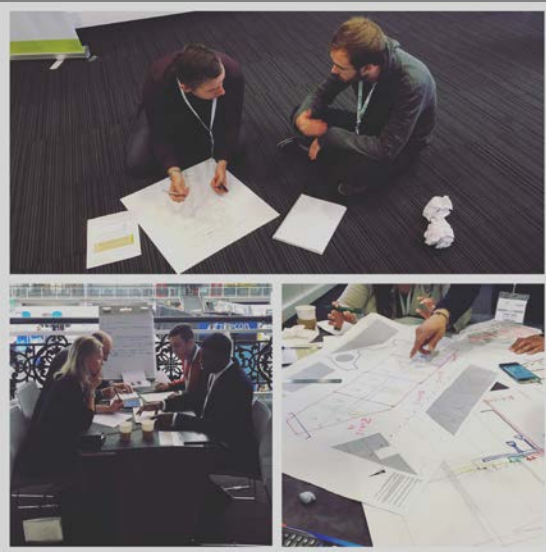


Teambuild Event



Objectives of this activity

- Exposing students from both gender to a multi-disciplinary collaborative working in an extracurricular activities
- For students to get the right employability skills once they graduate to help change construction industry condition to a more positive experience
- Getting staff from both gender and various professionals to work together collaboratively and be role models to students



Teambuild Event

What it is about:

- Running for four years
- Multi-disciplinary group competition
- Initially aim at second year UG students but word of mouth spreads and final year + master students plead to participate too
- Jury and mentor from various professionals in the construction Industry and even presentation of both gender
- Task: one to three days event where multi-disciplinary groups asked to complete challenges throughout various stage of construction project
- Encourage equal gender representation













Teambuild Event



Teambuild Event – Trial Run

- We are trialing this with high school/college students before they decide on their career path
- Drone footage/survey allow the project to be visualised and repeated easily for other set up/environment



Teambuilding Exercise with Professional Institutions: CIOB

- One evening competition event
- Female and male judges from various professional disciplines in the construction industry
- National event across UK



Hackathon across other Professionals (for Construction, IT and Healthcare Sector)

Who is driving and leading this:

- Jennifer Hardi (Architectural Technologist and Engineer)
- Safia Barizkai (IT Engineer)
- Syeda Rahimunessa (Business Development Manager at Enterprise Centre)
- Sally Hardy (Healthcare)





What is it about: Hackathon between
Construction, Occupational Therapist and IT
Engineering students

Task: to design a house for dementia elderly

One day competition event

Female and male judges from the three different
professions

International Construction Teambuild

What is it about: Three days challenge to build a pavilion using low carbon renewable materials – the use of bamboo

Who is it aim for: undergraduate and postgraduate students from all courses within architecture, engineering and construction area

This is coincided with the STEM week for school students

Who are the collaborators:

Mentors/Colleagues: 11 (7M 4F)

Structural engineer (M)

Two architects (M) and (F)

An architecture technologist/engineer (F)

Civil Engineer (F)

Building Services Engineer (2M)

Landscape Architect (M)

Tourism (M)

Environmental Engineer (M) (F)

Students participating: 41 (35M 6F)

PhD Students (3M) (1F)

Civil Engineering Undergrad (1M)

Arch Tech students (10M) (3F)

Arch Eng (10M) (1F)

Building services engineering students (10M)

Building surveying students (1M) (1F)



International Construction Teambuild

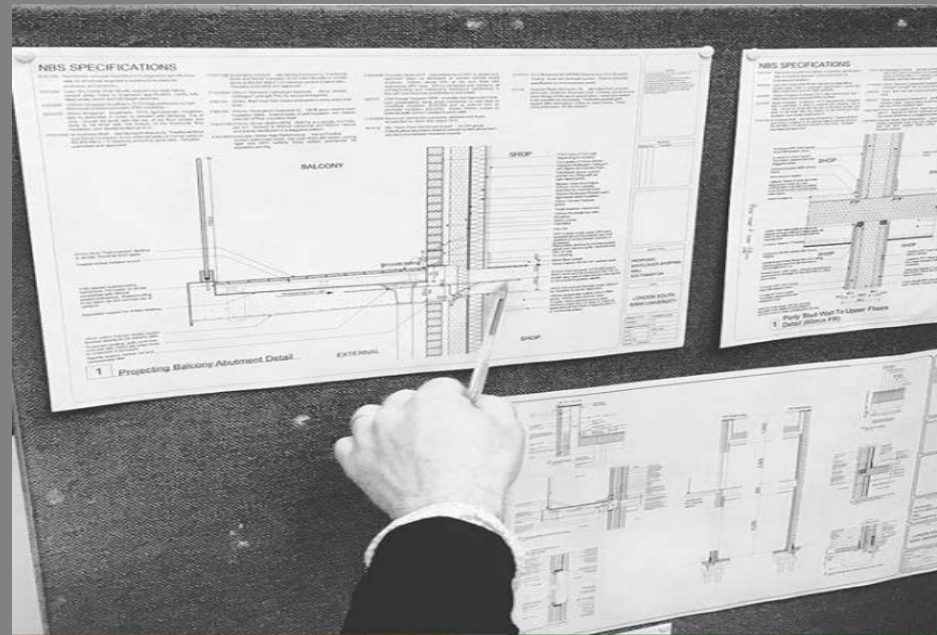


End of Year Show

What is it about: Every year, final year students in AT and AE need to present their design project to external judges

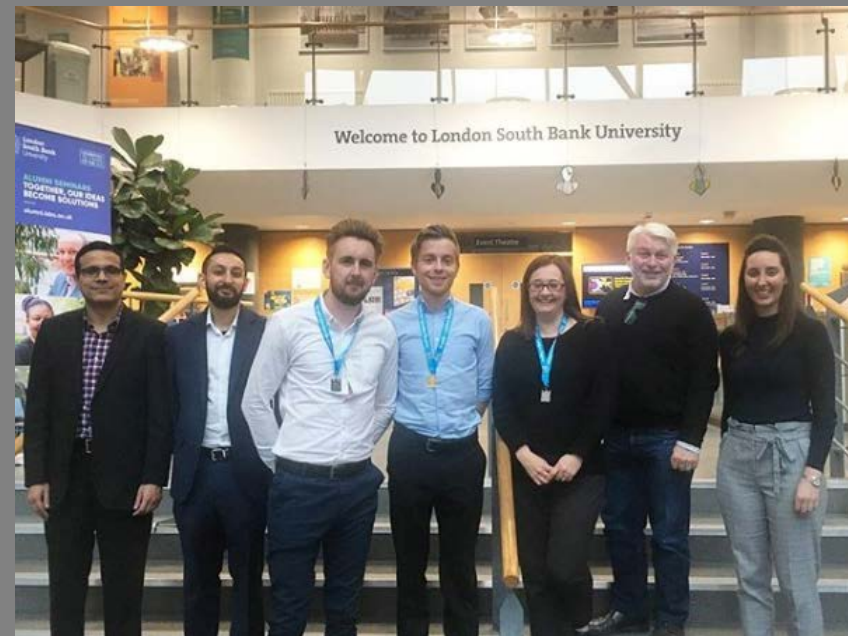
Judges from both genders and from different background were invited to provide their expert professional input

This event is open to members of public (including school students and career advisors) to raise awareness of the AT and AE profession





End of Year Show



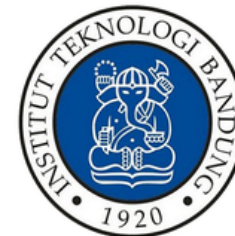


International Multi-disciplinary Collaboration Teamworking Activities

- About the project

HEFCE and RAEng funded project

- The mission: to raise awareness of climate change, plastic waste and how we can contribute to tackle this problem from tourism, construction and STEM point of view



International Multi-disciplinary Collaboration Teamworking Activities

- Task: to design a waste recycling facilities with supporting sustainable facilities on a given site in Indonesia
- Location: A village in West Java





International Multi-disciplinary Collaboration Teamworking Activities

- The mentors:

Indonesian team:

Tourism (1M)

Landscape Architect (1M)

Architect (1M)

Environmental Engineering (1M)

UK team:

Architecture/Technology/Engineering (1F)

Structural Engineer (1M)

Sustainable Tourism (1M) (1F)

Building Services Engineer (3M) (2F)





International Multi-disciplinary Collaboration Teamworking Activities

- The students participants

Indonesian students:

Tourism (5F)

Landscape Architect (3M 2F)

Architect (3M 2F)

Environmental Engineering (5F)

UK team:

Architecture/Technology/Engineering (1F 9M)

Building surveying (1F)

Sustainable Tourism (1F)

Policy Advisor (1F)

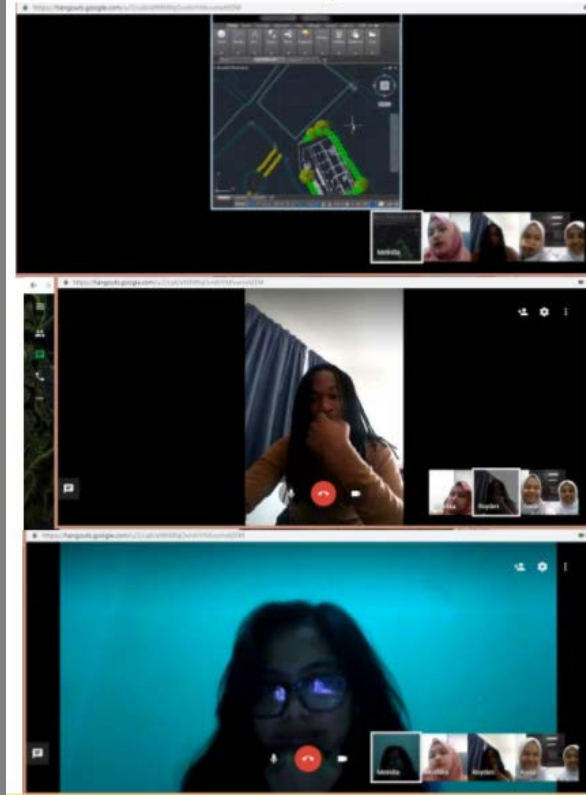
Building Services Engineers (3M)



International Multi-disciplinary Collaboration Teamworking Activities



International Multi-disciplinary Collaboration



International Multi-disciplinary Collaboration



Receiving area

Marga cinta Village master plan

International Multi-disciplinary Collaboration



International Multi-disciplinary Collaboration



International Multi-disciplinary Collaboration



International Multi-disciplinary Collaboration



Benefits and impacts

- Students agree that they have benefited greatly from this experience
- Groups with mix gender tends to perform better than single gender groups
- Students understand the roles and expertise of other disciplines more
- Part time students sharing their experience with their employer
- Positive collaborative working environment enhanced for both staff and students
- Staff become role models for students



Conclusion

- Result from the study shows that the best solutions are developed when problems are tackled by teams and when those teams have a broad range of backgrounds and perspectives.
- Every person brings a different experience; without women or minorities, a team lacks diversity of perspective, and creative solutions are lost. Science needs women in STEM. Society needs women in STEM. Without women in these fields, half of our best ideas are lost.
- Women in general are much more collaborative than men are. Men are more competitive, women are more collaborative, and companies are starting to realize how valuable that collaboration is. Collaboration between adjacent, related fields brings an integrated, holistic perspective.



Conclusion

- Interaction between lecturers and students is encouraged
- Participation of both female and male students are crucial (aim for 60% male / 40% female ratio as a start)
- Broadcasting of the activities through the institutional webpage as well as social network is important
- Integration of male students is mandatory
- Engaging men and boys for gender equality is crucial to anchor the belief that achieving gender equality is about transforming unequal power relations between men and women.
- Men need to be engaged as gender advocates – speaking out as active agents and stakeholders who can transform social norms, behaviours and gender stereotypes that perpetuate discrimination and inequality.

Thank you for
listening!



Jennifer Hardi

Email: hardij@lsbu.ac.uk

Linkedin:

<https://www.linkedin.com/in/jhardi>

Instagram: @hardij

Twitter: @hardij

