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Designing Inclusive Approaches in Intensive Team-Based Engineering Learning Environments

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ABSTRACT

Engineering education is rapidly changing. The adoption of active learning in all its forms requires educators to keep abreast of the pedagogical changes whilst at the same time supporting staff and students in moving away from stereotypical behaviours and encouraging inclusive approaches to interactions in order to ensure an equitable education for all. As part of the design of a new integrated framework at UCL, the Integrated Engineering Programme (IEP),[1] the design team took steps to ensure that inclusion was considered at every stage, from the themes of group Challenges to consideration of design and professional skills. The intent was to help all students engage as widely as possible with the technical challenges and ensure that no group of students was adversely affected by any of the changes that would be introduced. The move to a more intensive team-based learning environment was considered a possible threat, in particular to women students. Specifically the design team did not frame any of the measures as being for women students, but focused on creating inclusive team environments. A widely used assessment tool, StrengthsFinder 2.0 (Rath, 2007), was introduced for all students in week one of term one. Over the five years of the IEP a series of feedback surveys, focus groups and reflections from staff and students have contributed to the refining and development of the IEP. This paper presents insights into the programme and the introduction of STRENGTHS, and first results from the team working focus groups. In particular the paper considers how inclusion and the professional confidence of women (and men) is being addressed and evaluated. This is a work in progress and the programme is subject to ongoing review and adjustment.

KEYWORDS

Women; engineering, problem-based learning; strengths coaching; inclusion, CliftonStrengths

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BACKGROUND

Since the 1980s, initiatives to address the imbalance of men and women in engineering have focused largely on representation in the form of absolute numbers—filling the "pipeline" and addressing retention and promotion. In contrast, the systems, processes, and behaviours that define departmental teaching cultures, how team-working is taught, addressing behaviours of students towards each other in teams, and the growth of confidence of women students require further attention.

Women's participation in engineering in the United Kingdom reached a plateau in the 1990s at an average of 15% across engineering and technology subject disciplines (Kirkup, Zalevski, & Batool, 2010). Kirkup et al. (2010) reported that 42% of men compared to 21% of women STEM graduates transitioned into STEM-related jobs. Current data on female representation in engineering in the United Kingdom are shown in Figure 1.

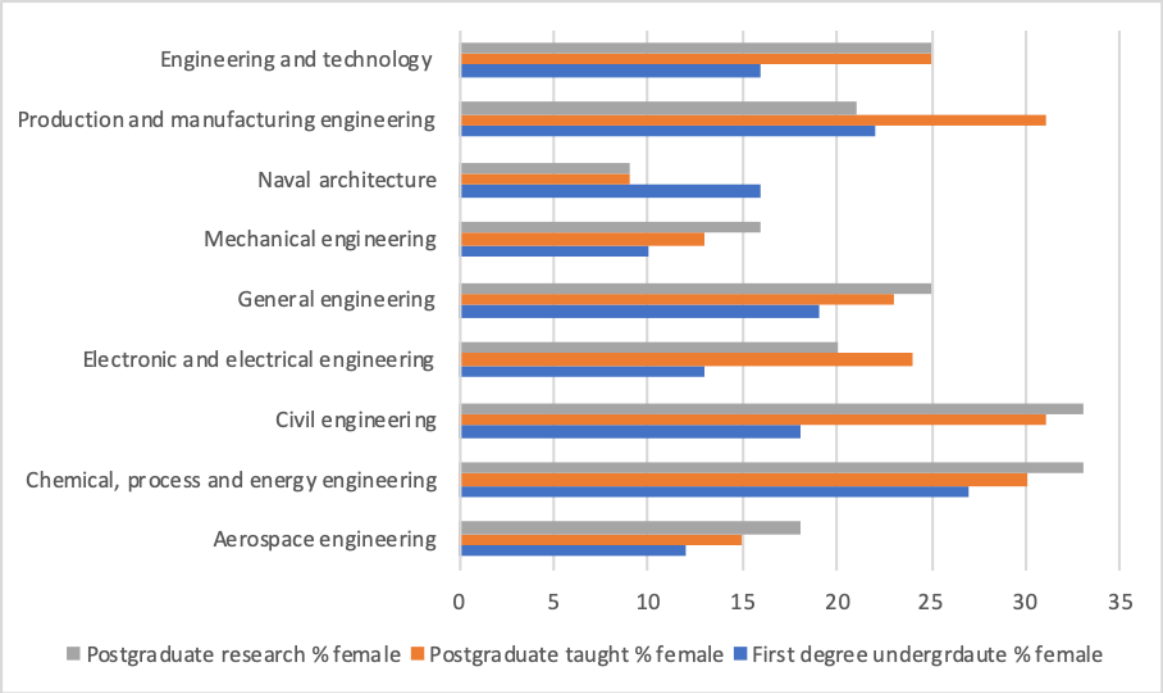

Figure 1. Take-up of selected engineering degree courses in the academic year 2015 to 2016 by gender and degree level in the United Kingdom (Engineering UK, 2018).

These findings might be explained in part by Cech, Rubineau, Silbey, and Seron (2011), who found what they defined as lower professional role confidence amongst women engineering students. As an indicator, this term describes a woman's likelihood of persisting in an engineering major or career. The work involved a largescale diary study across four engineering schools and one of the study's significant findings was evidence of women being assigned lower priority and

marginalised tasks compared to their male colleagues—a manifestation of implicit and persistent bias and stereotyping (Cech et al., 2011).

The state of the art of engineering education includes pedagogical changes towards active learning approaches (Graham, 2018). These approaches involve increased team-working and collaboration. These changes cause concern when considered alongside reports of persistent marginalisation within teams of some female students in mixed gender teams. Whilst this marginalisation has been underreported in the literature, it has been documented through a longitudinal diary study and linked to lower professional role confidence in women students (Seron, Silbey, Cech, & Rubineau, 2015). This is compounded beyond the peer group with female students receiving the "wrong" kind of help, for example from technicians. This has been termed "executive help," with technicians doing the work for women students rather than helping them overcome the difficulties they face. This undermines their skill development and grit—otherwise referred to as strength of character or resolve (Powell, Dainty, & Bagilhole, 2011)—and may affect their persistence through to the end of study.

The complexity of helping students feel included and valued when engaged in group work for project- or problem-based learning cannot be understated (Ohland et al., 2012). Whilst academics have observed that women are treated by male students in stereotypical ways, mostly women engineers themselves refute the suggestion that they get less out of their courses and experiences than their male colleagues (McWhinnie & Peters, 2012). Gendered team experiences have been documented and reported in work of Seron et al. (2015) and Silbey (2016).

Exploring Differences in Engineering and Technology Graduate Destinations

The initial impetus for this work at UCL began with a project to explore gender differences in the career intent of STEM undergraduates in engineering and technology: UCL partnered with Katalytik to undertake this.[2] Funding from the UK Higher Education Funding Council "HE STEM" programme was awarded to UCL for the "Set to Lead" project. This was part of £21 million allocated to improving teaching and learning across all STEM disciplines.

The catalyst for the project was the assertion that men entered STEM professions on graduation compared to women in a ratio of 2:1 (Kirkup et al., 2010). Is this true in engineering? And if so, what can be done to address this? The project comprised three elements:

- a large-scale survey of undergraduate engineers that explored the perceptions and aspirations of students around courses and careers, and a mapping of first destinations;
- roundtable discussions with employers, recruiters, and academics on what could be done to improve the career confidence of women and increase the transition of women graduates into engineering jobs; and

- development of an intervention informed by the survey and discussions, including scenarios, team activities, and identification of the gap in how teams are introduced and trialling approaches to build inclusive teams.

Over 4,500 cleaned scripts were completed, and a detailed analysis undertaken alongside first destination data from the Higher Education Statistics Agency (HESA) and the UK Labour Force Survey. The analysis found that male students believed female students to be not as well integrated within their courses as the men, additionally not getting as much out of their courses as their male counterparts (McWhinnie & Peters, 2012). Discussion with 25 employers highlighted: lower confidence amongst female students; lower performance in group assessment centred activities; higher expectations of male students of themselves; and stereotypical attitudes of male students towards their female peers.

Both academics and students alike asked for more help and support for students: in team-based projects with regard to the management of tasks; assigning group and leadership roles; and how to motivate and engage their peers. These observations informed the second part of the project—to design and pilot interventions that addressed the concerns highlighted.

Previous methods aimed at boosting the performance and confidence of women have focused on remediation—"fixing" the women through confidence classes that, by their very design and nature, only served to highlight differences between students, causing the women to stand out further. Many women engineering students shun such initiatives. To address this concern from women students, a different approach was formulated. "Set to Lead" piloted an inclusive approach to collaborative learning and interaction aimed at providing equity of experience and learning for all students.

The Set to Lead project invited participating employers to co-design a problem for students that addressed business and societal issues. The projects were: the role engineers play in keeping our roads safe in unexpected and harsh weather; designing and building sustainable schools in Africa; and transforming a business from a consultancy to a product-based business to retain talent who have moved into a different life phase since starting with the company.

A positive psychology tool, StrengthsFinder 2.0 (now called, and referred to throughout as, CliftonStrengths[3]) from the Gallup Organization was introduced by a leadership consultant and coach from Microsoft (Helen Duguid), and piloted with 10 (five male and five female) self-selected electronic and mechanical engineering students at UCL and through the Women's Engineering Society in two regional workshops in Birmingham and Glasgow with a total of 31 participants, all female. The purpose of introducing CliftonStrengths was to provide a vocabulary with which to talk about different approaches to thinking and strategies for getting things done in a project setting. Constructive feedback from observing academics and participants informed the next steps.

Following the initial project, an internal review was undertaken at faculty level. Two departments agreed to pilot the use of CliftonStrengths with the first-year cohorts. This comprised around 100 students in each department. This pilot took place in the academic year 2012–2013 in electronic engineering and computer science. The electronic engineering pilot took place in a design project to build a bumper sensor. This was an intensive five-day project, whilst in the computing pilot, students worked in small groups developing an App with an external client. An introductory workshop covered strengths, teams, management, leadership, and an introduction to stereotypes and unconscious bias that had been developed in the preceding project.

A debrief session was held the week after the project was completed in order to reinforce learning and promote self-reflection on the students' experiences. In electronics, in the previous five years of the design project, around half of the student teams produced a working prototype, whereas in this pilot year, all of the teams produced a working prototype. It should be stressed here that the aim of the design project was to introduce team-working and lab classes, and not to produce a successful working prototype. Students found the CliftonStrengths tool a useful aid for communication and as an ice-breaker to getting to know each other. Some of the groups believed the tool was a vital part of the success of their team and indeed demonstrated how they had used the team grid to highlight clustered themes and gaps. Feedback was collated on post-it notes and covered feedback on the activity and team-working. Additionally, a self-reflection activity asked students for detailed feedback and several students mentioned the positive aspects around inclusion:

> Looking back at the scenario (and forgetting the given strengths) I can give examples of when theses [sic] strengths helped, especially to overcome the cultural gap between myself and the three Chinese students in my group. (Electrical, Year 1, March 2012)

Following positive feedback from students, CliftonStrengths was designed into the first year of the Integrated Engineering Programme (IEP) at UCL in 2014 (Tilley, Peters, & Mitchell, 2014). Students are introduced to the tool in a lecture, take the online assessment in the week after their enrolment, and have a two-hour lecture on teams and leadership. Ongoing support is provided through a CliftonStrengths portal, Moodle Virtual Learning Environment (VLE), trained postgraduate teaching assistants, and a Gallup Certified Coach. During a five-week project student teams are given a half-hour coaching session. Via annual reviews of student feedback, the implementation of the IEP continues to evolve.

PERSONALITY AND PERSONAL AWARENESS TOOLS

Employers use a wide variety of psychological assessment tools, many based on significant bodies of interview-based research that can offer insights into personality, working styles, and leadership potential. In this regard, strengths and value-based tools are currently popular. At the time of the Set to Lead project in 2011, a review of how students were assisted when learning about team activities demonstrated a lack of institution-wide practice from the universities in the Set to Lead discussion groups. Approaches varied by course or module. Tools cited were

typically used by the academic earlier in their career or by a leadership trainer they had encountered. The most commonly cited tools were from the Myers-Briggs Foundation (Briggs and Briggs Myers, 2015) and The Nine Belbin Team Roles tool (Belbin, 2010). [4]

These "type" tools provide students with a vocabulary to describe their personal approach and preferences for ways of working. The aim of the IEP design team was to facilitate the creation of a team culture of respect and a mechanism for appreciating differences in styles, personalities, culture, and degree of extroversion. This is based on the notion that each student should:

- get the maximum, comparable benefit from an active learning project; and
- explore and learn how to interact and cooperate with people from different backgrounds and personality types as an essential life and professional skill.

Feedback from students included: "this is a good way to have a discussion around a difficult situation"; "it's a good icebreaker when we don't know each other well"; "It helped us realise where we were going wrong." The tool depersonalises situations and helps students see the value in having people who think differently in a team.

UCL adopted CliftonStrengths for several reasons: it was becoming increasingly popular with employers, including technology and engineering employers; it is based on a positive approach, appraising what people do right rather than what they do wrong; it is research based; affordable; and comes with a wide range of supporting materials. Further, the language was found to be accessible to both students and teaching staff. Another important reason is that it provides students with a way to give others space to be themselves, for example, time to think more deeply, or to fulfil the need to get started as soon as possible. The 34 talent themes of CliftonStrengths were found to provide greater nuance of ways of thinking, feeling, and behaving compared to Belbin (nine types) and Myers-Briggs (16 character combinations) and gave enough information to feel personalised. Simple maths (34 x 33 x 32 x 31 x 30) helps you work out that the chances of having the same top five themes in the same order as anyone else is 1 in 33 million (Rath, 2007), whilst also remaining comprehensible to young people.

During the first year of the IEP and the introduction of CliftonStrengths, personal strengths reflections were collected from students:

> We now respect each other's voices, taking each and every word into careful consideration before giving feedback to their contribution. (Male, Computing, Year 1, 2013–2014)

> StrengthFinder is rather accurate… I rather lack in the execution department… I'm a rather laid-back person and rarely take the initiative… but I am a big communicator. (Male, Civil, Year 1, 2013–2014)

> To know which ones are exactly my top 5 strengths is very useful because that helps me to understand why I set my goals in the way I do. (Female, Year 1 Civil, 2013–2014)

> I truly believe that the test was helpful for me as it helped me to realise talents that I had never thought about before. Now I can use my strengths when working in teams and my aim now is to make sure that all team members can work well together and at their top potential. (Female, Computing, Year 1, 2013-2014)

However, some students rejected the idea that an online questionnaire could prove useful in developing self-awareness and that it was a waste of time. Further feedback was obtained by the certified strengths coach taking part in tutor group meetings:

> You just chose the answer you think will give the right answer. How are you going to answer "Would you stop and help someone with something?" Of course you're going to say "Yes I'd help them." (Male, BioMed, Year 1, 2015–2016)

> You learn things from working with people not from words. (Male, BioMed Year 1, 2015–2016)

Feedback was gathered regarding the level of departmental support and use of strengths. The conclusion was that further work was needed on introducing and embedding use of the tool, as there was variability across departments. As a result, training was provided by the certified strengths coach (first author J. Peters) for the postgraduate teaching assistants and tutors. This contributed to the use of the strengths tool and subsequent development and introduction of an intentional learning plan (ILP):

> Often the role of personal tutor is lost by the end of Term 1, if you haven't established a good relationship with your student. Talking to the students about their personal strengths, their ILP and short- and long-term goals has helped to keep discussions going throughout the year. (Department tutor and participant in the pilot of the IEP)

Over the years of the IEP, technology and learning support continue to evolve the method of recording achievement and use of self-reflection. The aim is to move to a point where the staff are all confident in strengths coaching techniques.

THE IEP AND INCLUSION

The Integrated Engineering Programme (IEP) at UCL was founded on the belief that, in order to change the world, students must be taught differently (Graham, 2018). Developments in active learning were adopted and elements of the Set to Lead project incorporated, as well as a broader perspective of inclusion around design and professional behaviours. This thinking was supplemented with work from the University of South Australia (Mills, Ayre, & Gill, 2011), published after the

end of the Set to Lead project and the Gendered Innovations project (Schiebinger et al., 2018). Peters (2018) reviewed the IEP and added strands of inclusion across all of the professional skills. These approaches are now summarised in the *Designing Inclusive Engineering Education* report (Peters, 2018).

The IEP brings together students from across seven disciplines in problem- and project-based learning (PBL) activities. These are designed to support both technical and professional skills development. A range of PBL activities range from one to five weeks over a 10-week term (Mitchell, Nyamapfene, Roach & Tilley, 2019). The overarching aim was to develop engineering students through practising professional skills in the pursuit of their engineering learning—skills that upon graduation will make them workplace ready and able to slide seamlessly into an intense role as a junior engineer. One of the specific elements of the IEP, where first year students can put their engineering knowledge into practice, is "The Challenges." In the Challenges course, students work together in interdisciplinary design-centred project-based experiences. This course consists of two five-week design challenges linked to authentic global, social, and ethical issues. Challenge 1 is about sustainability, and Challenge 2 about global health.

Assumptions and Approach

At the heart of the IEP are team experiences and reflective practice. Students are given a structured introduction to teams and teaming, and all students take a positive psychology assessment—CliftonStrengths from Gallup—in the first week of term. The ambition was to realise inclusive working, and to introduce students to a way of talking about what they bring to, and need within, a team to help them operate at their best. The intervention was designed to shift team cultures and ways of working that worked for all and in no way suggested that it was a "woman in engineering" programme. The only other relevant shift was that a student-led group, affiliated to the Women's Engineering Society, was set up around the same time.

The CliftonStrengths tool facilitated conversations that helped students go beyond stereotypes and take more meaningful learning away from each of the long projects—the Challenges—they embark on. Team coaching sessions help students to respect and appreciate that each person has their own unique way of thinking, connecting with others, influencing, and getting tasks done. Inclusion has further been introduced in the programme design by situating projects in different countries, considering different users, and embedding inclusion within the professional competency elements of the programme (for example design), critical thinking, and communication. The language of inclusion from design to assessment was observed to ripple through into departments. As inclusion was an integral part of the IEP design process, it seemed pertinent to assess what had survived and what more could be done. The IEP team's learning had also grown, in particular through hosting a symposium on inclusive engineering education, summarised in the *Designing Inclusive Engineering Education* report (Peters, 2018). Funding was received from an internal UCL programme called "Liberating the Curriculum" [5] in order to review how the IEP was addressing inclusion. This project explored some 30 statements, each suggesting instances in which inclusion could be relevant to

engineering modules; these were based on the model described (Peters, 2018). Three case studies were created to share good practice further across the UCL engineering departments.[6]

EVALUATION METHODOLOGY

Several research projects conducted within the IEP explored gender issues about (1) students' expectations of their teaching and learning, and their confidence levels in a set of technical and transversal skills; (2) their confidence in working in interdisciplinary projects; and (3) their experiences in team-working. Data were totally anonymised before being analysed in IBM SPSS® software[7] for statistical analysis. Ethical approval was not needed as questions did not involve personal data, and the survey was part of the regular assessment of the courses. For reporting purposes, the level for statistical significance was set at 0.05. T-tests were conducted to assess whether the means of two independent groups (female and male) were statistically different from each other.

1. IEP Impact Survey (2014 and 2018 – First IEP Cohort)

The IEP Impact survey was run with the first cohort of IEP students starting their studies in the academic year of 2014–2015. In September 2014, at the beginning of their first term at UCL, a short online survey was completed via UCL Moodle Virtual Learning Environment[8] by the newly enrolled first-year students, across all engineering departments. The main aim of this survey was to understand the initial perceptions and expectations of the students upon entering their engineering education at UCL. The first set of questions in the survey asked the students to ascertain the future opportunities they seek as engineering graduates, as well as their own learning expectations and anticipations of the most beneficial and most enjoyable learning experiences during their time studying engineering. A second part of the survey asked the students to rate their level of agreement, using a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree), on a series of statements: their reasons for choosing to study engineering and to study at UCL; the role of engineers; and expected career outcomes. The final section of the survey asked students to reflect on their confidence levels, again ranging between 1 (not at all confident) and 5 (very confident), on a set of skills that are considered essential to anyone pursuing a career in engineering. A total of 308 first-year students completed the survey (25% female, and 75% male) in September 2014. The same cohort of students was invited to complete the questionnaire in the final year of their MEng degree, in April 2018. A total of 99 fourth-year students completed the survey (25% female, and 75% male, as in the first-year questionnaire).

For both female and male students, when starting their engineering degrees, *engineering team-based problem-solving* was expected to be the most beneficial learning experience (F = 44.70%, M = 49.10%). This was also expected to be the most enjoyable learning experience for male students (43.50%), whereas for female students, the most enjoyable were *activities and experiences to develop professional skills (e.g., leadership, team-working, communication*; 46.10%), followed by *authentic engineering industry experiences* (35.50%), and only then *engineering team-based problem-solving* (32.90%). Fourth-year students,

regardless of gender, considered *team-based problem-solving* as having been the most beneficial learning experiences during their degree (F = 75%, M = 85.30%), and also the most enjoyable (F = 66.70%, M = 65.30%). These findings may suggest that upon graduation, team-based problem-solving turned out to be more enjoyable for female students than initially expected when starting the IEP.

When asked how confident they were in their current skills and abilities, on average, female students rated their confidence in all skills and abilities lower than male students (Direito, Tilley, & Mitchell, 2018b). Significant statistical differences (signalled with a *) were found (Figure 2).

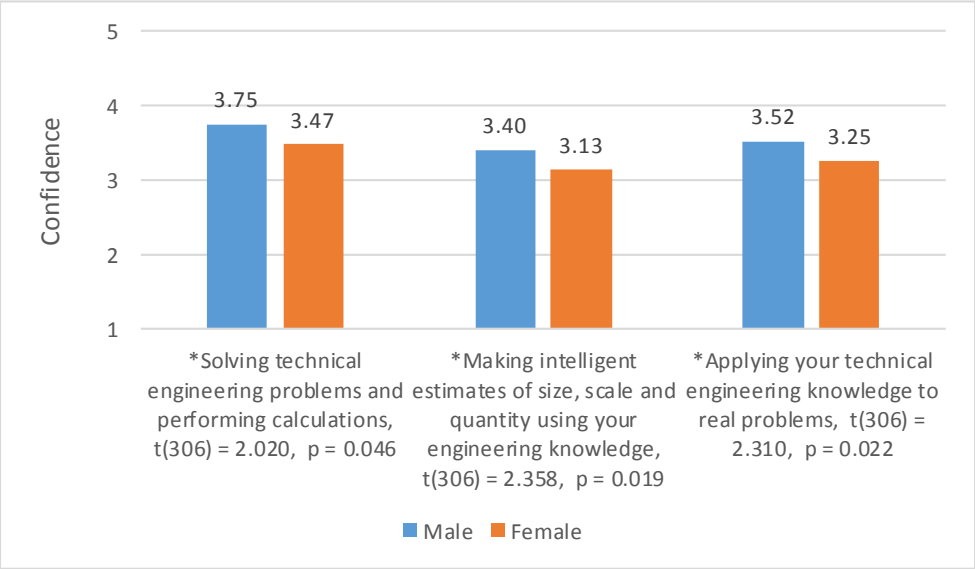

Figure 2: First-year students' confidence in their skills and abilities – Mean values and statistical comparison between genders

Unsurprisingly, compared to first-year results, the confidence of fourth-year students increased for all skills (Direito, Tilley, & Mitchell, 2018a). However, female students rated higher confidence levels in a range of non-technical skills, such as the ability to work effectively within a diverse and multidisciplinary team of people, *working with engineers from other disciplines*, and *interacting with clients to provide technical solutions that suit their needs*; and significantly lower in their ability in *applying your technical engineering knowledge to real problems* (M_{male} = 4.12, SD = 0.821; M_{female} = 3.71, SD = 0.690; t (97) = 2.216, p=.029) (Figure 3)

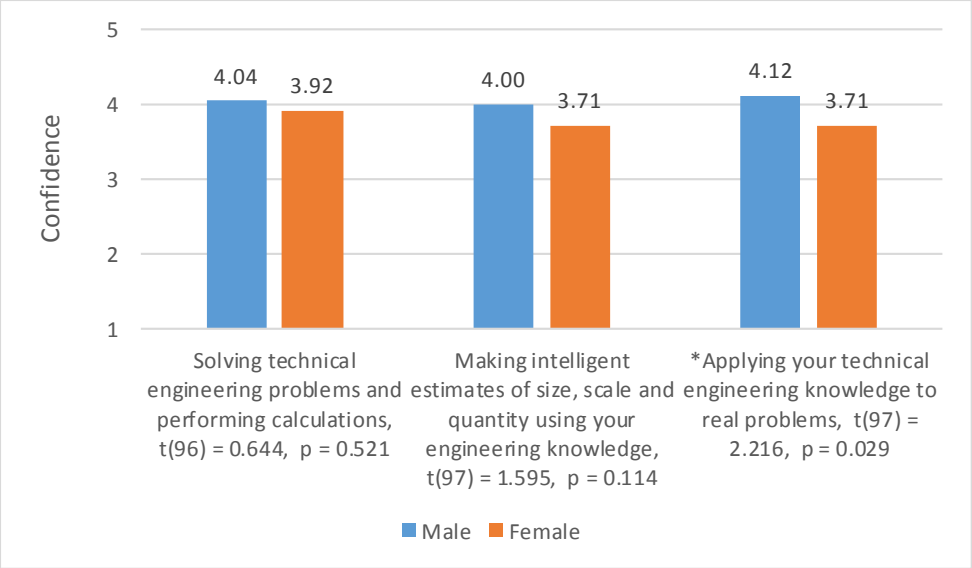

Figure 3. *Fourth-year students' confidence in their skills and abilities – Mean values and statistical comparison between genders*

These findings seem to suggest that female students in their final year were more confident in their social skills in comparison to male students, but lower levels of confidence persist with regard to technical skills when compared to first-year female students.

2. Experience of Interdisciplinary Projects Survey

An online survey was circulated via Moodle to evaluate the Challenges course at the end of the first semester for the academic year of 2017–2018 (December 2017–January 2018). The survey comprised questions about teamwork, interdisciplinarity, and interdisciplinary teamwork, which students had to rate according to a 5-point Likert scale (1 disagree–5 agree). A total of 413 students completed the survey, with 363 reporting their gender (female = 100; male = 263). No significant gender differences were noted. For example, when asked about the aims that students think to have attained on completing the Engineering Challenges, both groups were quite confident in their:

- ability and confidence to work effectively within a team (M*male* = 3.84, SD = 1.002; M*female* = 3.81, SD = 0.982. t(361) = -0.259, p = 0.796);
- understanding the purpose and interaction between multi-disciplinary teams working on a single project (M*male* = 3.50, SD = 1.105; M*female* = 3.62, SD = 1.117. t(361) = 0.936, p = 0.350); and
- awareness of leadership opportunities for yourself and others in the team (M*male* = 3.65, SD = 1.030; M*female* = 3.68, SD = 0.931. t(361) = -0.253, p = 0.801).

3. Teamwork Focus Groups

Finally, to further explore the students' experiences, in 2018, six focus groups (of five to six students each) on teamwork were run by undergraduate students themselves (IEP Student Ambassadors), guided by the third author of this paper. The purpose of this approach was to avoid observer effects. These groups were used to investigate how students report on their team process and experiences, and also to identify whether there were any gender differences in the experiences of teamwork. There were two mixed gender groups and four single gender groups.

This research is still under analysis, however, one of the largest issues reported was that of social loafing (the belief that people are prone to exert less effort on a task if they are in a group than when working alone) and the control students had over engaging some other students in the tasks. Aligned with the findings of Cech et al. (2011) and McWhinnie and Peters (2012), students reported there being no gender differences, yet used stereotyped language to describe behaviours. Whilst these differences may be small, they represent a cumulative effect and could contribute to the professional role confidence issues discussed by Cech et al. (2011) and Silbey (2016).

Further work will explore how the positive psychology tool, CliftonStrengths, can be used within groups to build greater self-awareness and an awareness of others, as well as grow professional role confidence. UCL is also working with employers to improve the transition to work.

DISCUSSION

This paper considers the development and impacts of consistently using and supporting students through a first-year undergraduate engineering programme at UCL. The programme was introduced five years ago and is based on team-working. The support for the team learning has evolved as the programme matures.

Alongside the introduction and development of the IEP, institutional learning has occurred regarding inclusion together with an (albeit unquantified) increase in the awareness of academics of the impact of unconscious bias—some of which has been student-led. At UCL institutional programmes include the "Why is my curriculum white?"—now a national campaign—and central teaching and learning initiatives such as the "Connected Curriculum" and "Liberating the Curriculum." These are in addition to mandatory diversity and inclusion training, which includes unconscious bias awareness and progress towards Athena SWAN awards across the faculty.

The journey is one of continuous improvement with attention being paid to small incremental steps and development based around academics' and students' own observations of possible change and adaptation. An internal grant enabled a review of inclusion within the IEP. A facilitated workshop, with 25 academic staff from the IEP, considered 16 statements (part of a wider analytical tool) that described inclusion across five levels of implementation (Peters, 2018; Peters & Wilson-Medhurst, 2018). The workshop was followed up with departmental interviews to explore the scoring of the 16 statements. The outcomes were three examples of good practice, which were turned into case studies of how inclusion had become

embedded within the department's own active learning modules beyond the IEP. These were written up and shared across departments. Mini projects centred around the development of more explicit appreciation and consideration of diversity and inclusion amongst students were identified for further consideration. These are in development and explore ways, through teaching, to make students aware of unconscious bias, engaging students with social science research and teaching inclusion and diversity.

SUMMARY AND NEXT STEPS

Activists have been arguing for over 20 years that the deficit approach ("fix the women" by providing extra courses and confidence) to women in engineering is wrong. Yet the switch to an inclusive approach has been slow and caught up in the push for diversity over inclusion. The inclusive engineering approach at UCL is about cultural transformation. In itself this is not a "quick fix." What is required is a determined, analytical mindset and the engagement of the whole teaching staff to make step-by-step changes, reflect and analyse progress, and further enhance methods of delivery and feedback to students. This provides a challenge for engineering educators—how to ensure equality of opportunity whilst delivering core professional skills to students.

At UCL, embedded within the Integrated Engineering Programme, a blend of methods has been used to explore participation and how students fit within teams. One of the aims was to explore team cultures and help women students gain as much from the team experience as their male colleagues. The approach explicitly did not label this as a "women in engineering initiative," but rather was about understanding how to provide the best learning experience for each student. The primary tool for developing self-awareness was CliftonStrengths—a tool developed by Gallup and based on a positive psychology approach. The tool provides students with descriptors for their dominant ways of thinking, feeling and doing, and the hypothesis was that this would remove focus on stereotypical behaviours and encourage students to consider what they could contribute and how. This paper explored the methodology and reports on both how this tool has been used, and initial findings from student focus groups. However, some students, whilst denying difference, still use stereotypical language. Further analysis and adjustments will continue to be made to the IEP.

Further evaluation of focus groups is underway, in addition to planning for further refinement of the teaming introduction and methods of addressing professional and personal confidence. Whilst some students anecdotally continue to use the tool outside of the IEP Challenge, the next step is to extend and observe its use within each department and year group.

ENDNOTES

[1] Further information on the Integrated Engineering Programme can be found at http://bit.ly/2HYis86
[2] UCL has partnered with Katalytik in the design and delivery of inclusion within the IEP. Further information on the work of Katalytik can be found at www.katalytik.co.uk
[3] Further information on the CliftonStrengths tool for higher education can be found at www.strengthsquest.com
[4] For Myers Briggs Assessment see www.myersbriggs.org and the Belbin tool, see www.belbin.com
[5] The UCL Liberating the Curriculum scheme and wider projects can be found at http://bit.ly/LiberateCurriculum
[6] Exploring Inclusion in the IEP http://bit.ly/2EuglIi
[7] https://www.ibm.com/analytics/spss-statistics-software
[8] https://moodle.ucl.ac.uk/

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