

# Futures in Engineering: Informing policy and practice and developing future research agendas via existing research

Dr Maria Pampaka and Dr Diane Harris

Manchester Institute of Education, The University of Manchester

## Background

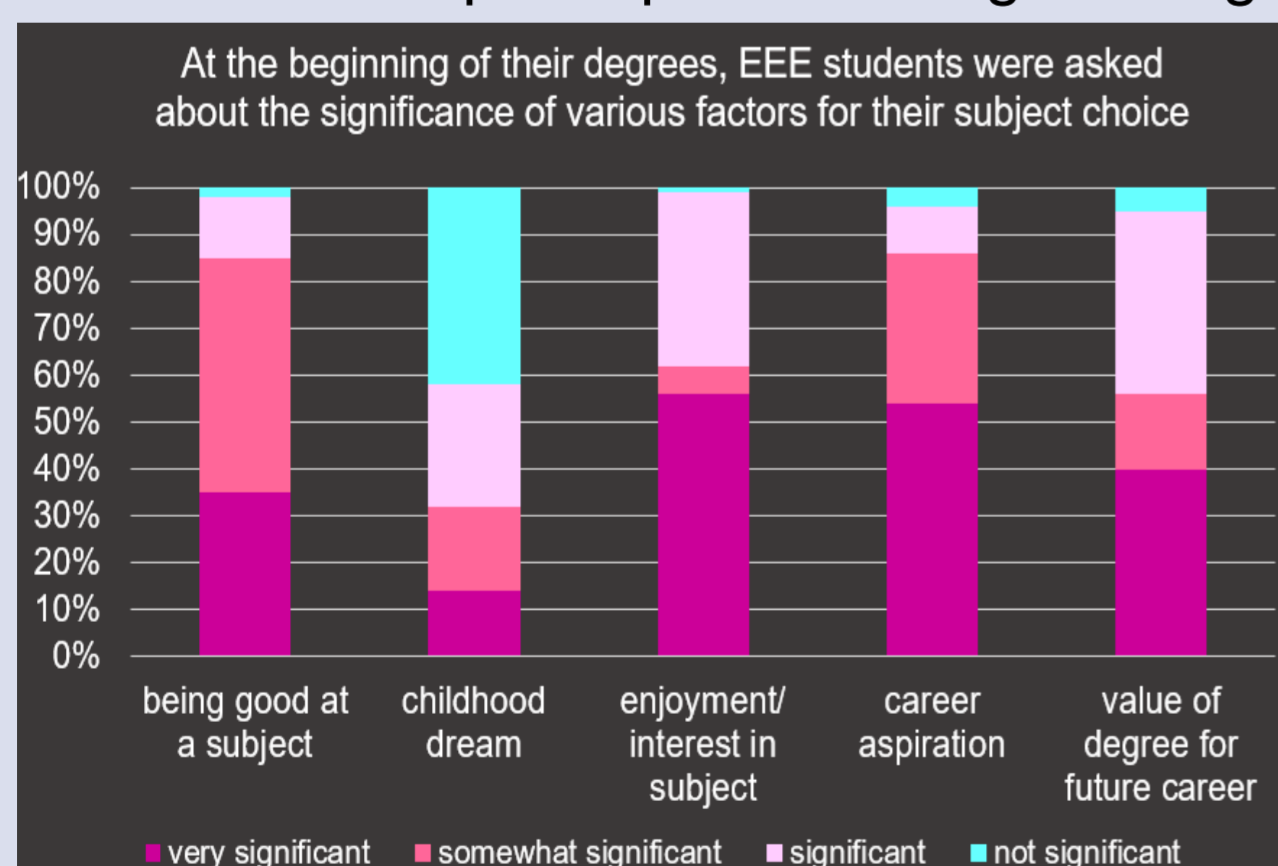
Currently, only 9% of practising professional engineers in the UK are women (WES, 2016) as compared with 21% across all Science Technology, Engineering and Mathematics (STEM) subjects (WISE, 2016). This is the lowest percentage of women engineers of the 28 European countries, over half of which have at least 20% (Perkins, 2013). When considering ethnic minority women, the percentages fall still further since the data show that men and women together only represent 6% of this workforce (RAEng, 2015). For over thirty-five years there have been incentives and initiatives to encourage women into engineering courses and careers but the problem of low recruitment remains. Although more acute in engineering, the problem exists across STEM and it is often referred to as the leaky STEM pipeline.

The issue is one of culture and there is a need for cultural change/transformation that will open up both recruitment and subsequent employment in engineering industries and STEM more generally.

## Aims and Objectives

We aim to inform policy and practice to facilitate changes in current approaches to the recruitment and retention of engineering students and practising engineers reflecting on evidence from our previous and ongoing studies e.g. Teleprism ([www.teleprism.com](http://www.teleprism.com)), Maths Anxiety (<http://mathsisok.com/>) and TransMaths ([www.transmaths.org](http://www.transmaths.org)) etc. These aims will be achieved by engaging with industrial partners and relevant stakeholders to fulfil the following objectives:

- To discuss findings on reported aspirations regarding engineering to help increase future participation in engineering.

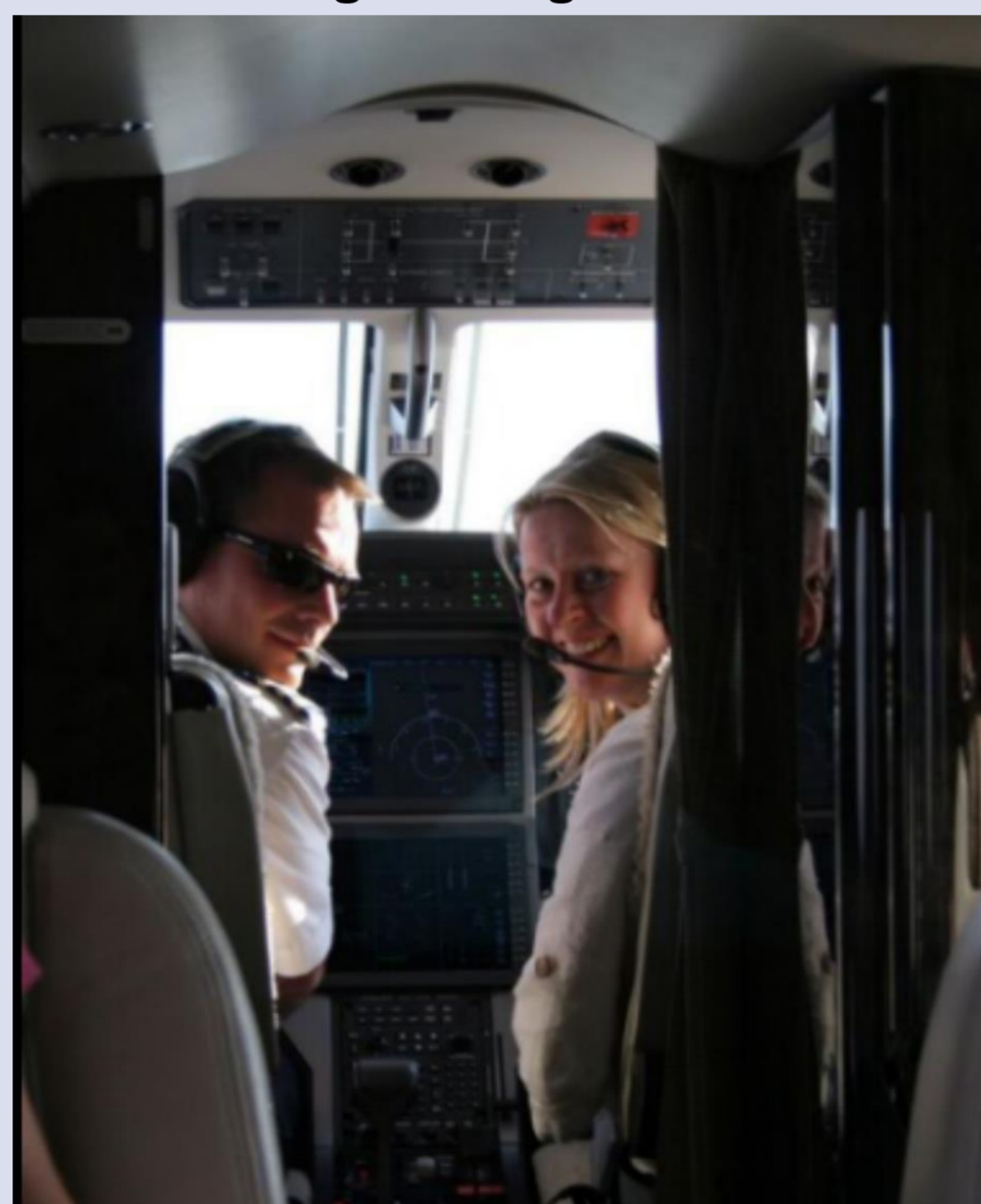


- To provide the basis for improving culture and inclusivity in engineering by sharing and debating gender-related findings.
- To invite reflection on those aspects of stakeholders' practice which require reviewing and development in the light of the research findings.
- To co-develop a new research agenda.
- To inform the research and development/evaluation work of the professional engineering institutions (PEIs).

## Benefits to the University and External Partners

This project builds on seven projects undertaken at the University of Manchester and will therefore provide the opportunity to disseminate our engineering-related findings to new audiences. The interest in this project demonstrates that this is an area of concern and has value outside academia which may lead to future collaborations with our external partners:

- **Jaguar Land Rover**
- **Women's Engineering Society**
- **IBM UK Ltd.**
- **AEON Engineering Ltd.**



Sharing our research will help our external partners to understand the drivers that affect career and lifestyle choices and will also provide them with valuable insights. Further, by working with the University of Manchester on an evidence-based policy will help to inform and influence educational experience to improve awareness and perceptions towards engineering as a career, better matching the nation's skills needs with the aspiration of the future labour market.

## Methodology

Our approach to the project will be based on:

- Organising two half-day workshops
- Taking the research into schools with the support of the Research Councils UK School-University Partnership Initiative (SUPI).
- Developing a research-informed comic for pupils and parents.
- Establishing and maintaining a web presence via dedicated web pages.

## Contact Details:

**Maria Pampaka:**

[maria.pampaka@manchester.ac.uk](mailto:maria.pampaka@manchester.ac.uk)

**Diane Harris:**

[diane.harris@manchester.ac.uk](mailto:diane.harris@manchester.ac.uk)

**Website:**

[www.researchingfuturesinengineering.com](http://www.researchingfuturesinengineering.com)

## Expected Outputs

### Engineering Industry Forum and Engineering Education Forum

These two half-day CPD-style sessions/workshops will enable long-term engagement with engineering businesses, professional engineers, the PEIs, academics and other groups and individuals who have significant insights into engineering education. Moreover the exchange of ideas from these disparate groups will facilitate the sustainability of the impact of the current work, help to shape our future agenda and support us in the development of a research proposal.

### Research-Informed Comic

To raise awareness of engineering opportunities among young people and provide a resource for industry and teachers to talk to students about engineering (freely available from our dedicated webpages).

### Presentation of findings

- in schools (via SUPI network)
- at the Engineering Professors' Council Recruitment and Admissions Forum

### Publication of three research papers

Submissions to peer-reviewed practitioner and research journals.

### Creation of dedicated web pages

To ensure access to our research.

## Expected Outcomes and Impact

**Policy Change:** Policy@Manchester will support the project by providing advice and guidance on developing a stakeholder engagement plan. They will also help us to engage with the Education Select Committee and the All Party Parliamentary Engineering Group.

**Practice Change:** The research findings will be presented to industry, the professional engineering institutions, teachers and pupils in order to provide insights into engineering education.



Quadcopter Challenge 2017, reproduced with kind permission of Raytheon UK

## References

- Perkins, J. (2013). *Professor John Perkins' Review of Engineering Skills*. London: Business, Innovation and Skills
- RAEng (2015). *Time to tackle ethnic diversity in engineering, says Academy*. <http://www.raeng.org.uk/news/news-releases/2015/november/time-to-tackle-ethnic-diversity-in-engineering,-sa>
- WES (2016). *Women in Engineering Statistics*. Stevenage: Women's Engineering Society.
- WISE (2016). *Women in the STEM Workforce*. <https://www.wisecampaign.org.uk/resources/2016/11/women-in-the-stem-workforce-2016>