



Dr Thea Morgan
BEng(Hons), PhD

Lecturer

Area of research

Developing novel pedagogical approaches to support project-based-learning design experiences in engineering design education

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Summary

My research focuses on the development of pedagogical approaches that enable reflection during project-based-learning (PBL) design experiences in engineering design education. During episodes of experiential learning, such as group PBL in engineering design education, students construct new knowledge (that is they learn) by reflecting on their lived experience. More accurately, they reflect on their 'perceptions' of that experience, meaning that the prior experience, knowledge, and worldview of the students will have a strong influence on the outcomes of learning from experience. The cognitive structure of engineering design students is heavily influenced by the positivist paradigm of engineering science, and so many students may struggle to learn, or not be open to learning, from experiential design projects, because the constructivist paradigm that underpins this type of learning is not in accord with their cognitive structure.

We need to find a way to sufficiently alter the cognitive structure of engineering design students, to encourage an openness to learning design experientially, and to reflect on that learning. In other words, the aim is to emancipate engineering design students from a restrictive worldview about the nature of knowledge and its acquisition. Current issues in engineering design education appear to relate to the reduced ability of students to reflect on personal design activity, based on a lack of understanding of the differences between design and science at a philosophical level. Current approaches to learning and assessment in engineering design do not reveal the underlying paradigms and paradoxes of engineering design education, and therefore limit the ability of students to reflect on their own experiential learning. The students effectively experience an 'epistemological block to reflection'.

Teaching

Design Project 2, Engineering Design

Design Project 4, Engineering Design

Design Project 5, Engineering Design

Keywords

- Project-based-learning
- Engineering design education
- Philosophy of design
- Design methods and processes
- Complexity

Memberships

Organisations

[Department of Civil Engineering](#)

Other sites

- [Engineering](#)

Recent publications

- Morgan, T, 2019, '[Enabling meaningful reflection within project-based-learning in engineering design education](#)'. in: Dirk Schaefer, Claudia Eckert, Graham Coates (eds) *Design Education Today: Technical Contexts, Programs and Best Practices*. Springer
- Morgan, T, 2018, '[Philosophy of design: enabling reflection within PBL contexts in engineering design education](#)'. in: *In DS 93: Proceedings of the 20th International Conference on Engineering and Product Design Education (E&PDE 2018), Dyson School of Engineering, Imperial College, London. 6th-7th September 2018 (pp. 442-447)*.. Institution of Engineering Designers, The Design Society
- Morgan, T & McMahon, C, 2017, '[Understanding group design behaviour in engineering design education](#)'. in: *Proceedings of the 19th International Conference on Engineering and Product Design Education: Building Community: Design Education for a Sustainable Future, E and PDE 2017*. Institution of Engineering Designers, The Design Society, pp. 56-61
- Morgan, T & McMahon, C, 2015, '[Design as the resolution of paradoxes: An exploratory study](#)'. in: *In DS 80-11 Proceedings of the 20th International Conference on Engineering Design (ICED 15) Vol 11: Human Behaviour in Design, Design Education; Milan, Italy, 27-30.07. 15 (pp. 215-226)*.. The Design Society, pp. 215-226
- Morgan, T & McMahon, C, 2015, '[Design as the resolution of paradoxes: An exploratory study](#)'. in: C Weber, S Husung, G Cascini, M Cantamessa, D Marjanovic, Monica Bordegoni (eds) *DS 80-11 Proceedings of the 20th International Conference on Engineering Design (ICED 15) Vol 11: Human Behaviour in Design, Design Education; Milan, Italy, 27-30.07.15*. The Design Society
- Morgan, T & Tryfonas, T, 2011, '[Adoption of a systematic design process: A study of cognitive and social influences on design](#)'. in: *ICED 11 - 18th International Conference on Engineering Design - Impacting Society Through Engineering Design.*, pp. 320-329
- Evans, R, Tsohou, A, Tryfonas, T & Morgan, T, 2010, '[Engineering secure systems with ISO 26702 and 27001](#)'. in: *2010 5th International Conference on System of Systems Engineering, SoSE 2010*. Institute of Electrical and Electronics Engineers (IEEE), pp. 1-6

[View complete publications list](#) in the University of Bristol publications system

Courses

Dr Morgan currently teaches 2 courses: