



UNIVERSITY OF LEEDS

This is a repository copy of *Embedding Human Factors and Ergonomics in MSc Organizational Psychology*.

White Rose Research Online URL for this paper:
<http://eprints.whiterose.ac.uk/137691/>

Version: Accepted Version

Proceedings Paper:

Davis, MC orcid.org/0000-0003-1577-7544 (2019) Embedding Human Factors and Ergonomics in MSc Organizational Psychology. In: *Advances in Intelligent Systems and Computing*. 20th Congress of International Ergonomics Association - IEA 2018, 26-30 Aug 2018, Florence, Italy. Springer, Cham, pp. 67-71. ISBN 9783319960791

https://doi.org/10.1007/978-3-319-96080-7_9

Reuse

Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.



eprints@whiterose.ac.uk
<https://eprints.whiterose.ac.uk/>

Embedding Human Factors and Ergonomics in MSc Organizational Psychology

Matthew C Davis¹[0000-0003-1577-7544]

¹ Leeds University Business School, University of Leeds, Leeds, LS2 9JT, UK
M.Davis@Leeds.ac.uk

Abstract. This paper reflects on the author's experience of embedding human factors and macro ergonomics content as part of an MSc Organizational Psychology program within a business school. The pedagogical underpinning of the author's Systems Thinking and Consulting Practice module is explained and key features that have been employed to engage students from a variety of backgrounds discussed. The key challenges encountered, including practical, institutional and disciplinary issues are outlined. The paper concludes with suggestions for positioning human factors and ergonomics teaching to appeal to a broad range of students.

Keywords: Socio-Technical Systems Thinking, Education, Organizational Psychology.

1 Introduction

This paper reflects on my own experience of embedding human factors and macro ergonomics content as part of an MSc Organizational Psychology program within a business school. The topics are covered as part of a 15 credits module (Systems Thinking and Consulting Practice) designed to introduce students to Socio-Technical Systems Thinking (STST) as an overarching framework for considering human-technical work systems.

The opportunity for students to encounter human factors and ergonomics topics and methods within organizational psychology/occupational psychology masters programs in the UK has diminished. Finding ways to present the content in a way that engages an increasingly diverse student profile on such programs, in addition to the need to structure modules to draw a larger cohort to ensure operational viability within a business school environment presents challenges. I will discuss the approach I have taken to tackle such a scenario, the practical challenges encountered and the potential I see for broadening the appeal of human factors and ergonomics to students from other disciplines.

2 Systems Thinking and Consulting Practice Module

2.1 Approach and Pedagogy

The module reflects the research interests and projects of myself and colleagues, using STST as a consistent lens through which to consider the various topics. Reflecting the core STST philosophy on which it draws [1, 2, 3, 4], the module is designed to be multi-disciplinary, drawing students from both the MSc Organizational Psychology in addition to Engineering, Geography and Physics programs. This diverse student cohort is designed to promote cross-disciplinary knowledge sharing and to demonstrate the value that different skill and knowledge sets can bring to the discussion of complex problems. The module is structured around traditional lecture delivery, accompanied by small group seminars to discuss practical case studies and scenarios in depth. The module attempts to engage students in the topics and demonstrate the relevance to contemporary business. This is supported through incorporating interactive sessions run by human factors and applied psychology consultants, sharing their experience working on real projects and as part of multi-disciplinary consulting teams. In addition, a group assignment requires students to work in multi-disciplinary teams to analyze the BP Deepwater Horizon oil spill using a human factors framework e.g., Accimap [5], STS Hexagon [6], to generate practical recommendations and to present their findings in a consultancy style.

The practical case study application and consultancy orientated approach to the module was instrumental in building interest from program leaders in other departments in the university. The structure of the module enables demonstration of transferable skills relating to: research methods; analysis techniques and frameworks; cross-disciplinary working; synthesis of technical and academic resources, and; translation of findings for business audiences. The transferable skills are valuable to other social science and technical disciplines who need to demonstrate program level learning and skills outcomes to their accreditors. Furthermore, the nature of human factors and ergonomics as discipline areas help to ensure that students from both technical and more behavioral backgrounds find terminology and approaches that are familiar to them, helping to anchor them as they approach more novel material.

2.2 Key Research Topics Used to Engage Students

The material covered on the module reflect my own and colleague's interests. The lecture sessions are designed to focus on a specific project or case study that the lecturer has undertaken. The majority of projects relate to industrially funded or supported work, helping to reinforce the business relevant nature of the human factors and macro ergonomics topics to which they relate. The wide variety of application areas help to illustrate the cross-cutting relevance of socio-technical and ergonomics ideas. The key topics that the module is structured around include:

- System failure analysis and prediction using socio-technical frameworks and techniques [7]. This includes coverage of traditional accident analysis topics [5], in addition to consideration of business system failures [6];

- The design of physical workspace, in particular examining the challenges of designing contemporary open plan offices that support knowledge work [8];
- Technology and software design and the management of attendant change, in particular considering the application of socio-technical principles [3, 4];
- The design of tele-health solutions and approaches for modeling and evaluating competing scenarios [9];
- The application of macro ergonomics approaches, behavior change and socio-technical principles to promote environmental sustainability [10, 11, 12];
- Approaches to crowd management and the modelling of crowd behavior in routine and emergency situations [7, 13];
- Information acquisition and knowledge sharing behaviors, with particular consideration to the context of design engineers and their social networks [14].

3 Practical Challenges

A number of practical challenges in designing and delivering a human factors and ergonomics module that runs across a series of programs and faculties have been encountered. One particular challenge concerned the difficulties that arose due to students arriving with varying knowledge bases from different disciplines and backgrounds, with differing expectations regarding teaching styles and assessment formats. Whilst a key aim of the module is to introduce students to cross-disciplinary working and to equip them with the toolset to engage in this effectively, this can be more difficult for some students when the educational environment is significantly different to that which they are used to.

The institutional environment within UK business schools means that there is pressure to ensure that modules are attractive to greater numbers of students. The popularity of business degree programs, particularly at post-graduate level, has driven a focus on efficiencies of teaching. With finite staff time and higher student numbers to accommodate, there is a danger of modules that are seen as niche (i.e., attracting small numbers of students) being cut. This is particularly relevant to human factors and ergonomics modules which are likely to be run as part of specialist organizational psychology, or related behavioral programs, that attract smaller student numbers than general management programs. This context challenges us to consider how we increase the number of students on such modules, maintaining the core human factors and ergonomics knowledge base whilst simultaneously making the material accessible to a variety of disciplines.

Furthermore, a specific threat is posed to the coverage of human factors and ergonomics teaching within UK MSc Organizational Psychology programs. The effective downgrading of human factors and ergonomics within the British Psychological Society's QOcc Psych (Qualification in Occupational Psychology) Stage 1 [15] and the concomitant reduction in emphasis within accredited courses poses an existential threat to the understanding of human factors and ergonomics within the organizational psychology profession. Whilst the changes to the QOcc Psych are welcome in that they allow institutions to increase coverage of topic areas that they are specialists in, it also

provides cover for program teams to abdicate teaching topics that they consider difficult to resource.

4 Positioning Human Factors and Ergonomics to Appeal to Students Across Disciplines

My experience over the past 10 years of teaching human factors and ergonomics to psychology students has reinforced to me both the need to, and value in, teaching multi-disciplinary groups. As previously discussed, I believe that there is a pressing need to broaden the appeal of human factors and ergonomics, to ensure financial viability of modules within business school environments. I also believe that the pedagogical and practical value of teaching human factors and ergonomics ideas to students from diverse backgrounds make this beneficial to students also.

Designing and redesigning the Systems Thinking and Consulting Practice module to improve and respond to student feedback has yielded insights into student perceptions. This experience leads me to make a number of suggestions regarding how human factors and ergonomics may be positioned to attract interest from a broad range of student groups and in particular to appeal to students from business/social science disciplines. These suggestions include:

- Emphasizing transferable analytic skills and methods;
- Demonstrating application across a range of domains and problems;
- Including business case studies and very practical applications;
- Incorporating multi-disciplinary working;
- Building in practitioner interaction and industrial speakers;
- Making the inclusion within organizational psychology programs a positive point of differentiation.

5 Conclusion

Human factors and ergonomics contributes greatly to the knowledge base of organizational psychologists and remains an important part of their training. The institutional and broader disciplinary environment poses challenges to traditional ergonomics modules on MSc Organizational Psychology programs. I present a research centred and skills based approach to teaching human factors and ergonomics, an approach that emphasizes and makes a virtue of the multi-disciplinary profile of the student cohort. Human factors and ergonomics provides a valuable toolkit and mind-set for approaching a diverse range of problems for students from many backgrounds. This broad applicability offers a route to both extending the impact of human factors and ergonomics, in addition to supporting the future viability of modules and programs.

References

1. Trist, E. L., & Bamforth, K. W. (1951). Some social and psychological consequences of the longwall method of coal-getting: An examination of the psychological situation and defences of a work group in relation to the social structure and technological content of the work system. *Human Relations*, 4(1), 3-38. doi:10.1177/001872675100400101
2. Cherns, A. (1987). Principles of sociotechnical design revisited. *Human Relations*, 40(3), 153-161. doi:10.1177/001872678704000303
3. Clegg, C. W. (2000). Sociotechnical principles for system design. *Applied Ergonomics*, 31(5), 463-477. doi:10.1016/S0003-6870(00)00009-0
4. Mumford, E. (1995). *Effective systems design and requirements analysis: The ethics approach*. Basingstoke: Macmillan.
5. Salmon, P. M., Cornelissen, M., Trotter, M. (2012). Systems-based accident analysis methods: A comparison of Accimap, HFACS, and STAMP. *Safety Science*, 50(4), 1158–1170. <http://dx.doi.org/10.1016/j.ssci.2011.11.009>
6. Davis, M. C., Challenger, R., Jayewardene, D. N. W., & Clegg, C. W. (2014). Advancing socio-technical systems thinking: A call for bravery. *Applied Ergonomics*, 45(2), 171–180. <http://dx.doi.org/10.1016/j.apergo.2013.02.009>
7. Clegg, C. W., Robinson, M. A., Davis, M. C., Bolton, L., Pieniazek, R., & McKay, A. (2017). Applying organizational psychology as a design science: A method for predicting malfunctions in socio-technical systems (preliminary). *Design Science*, 3, 1-31. doi:10.1017/dsj.2017.4
8. Davis, M. C., Leach, D. J., & Clegg, C. W. (2011). The physical environment of the office: Contemporary and emerging issues. In G. P. Hodgkinson & J. K. Ford (Eds.), *International review of industrial and organizational psychology* (Vol. 26, pp. 193 - 235). Chichester, UK: Wiley.
9. Hughes, H. P. N., Clegg, C. W., Bolton, L. E., & Machon, L. C. (2017). Systems scenarios: a tool for facilitating the socio-technical design of work systems. *Ergonomics*, 60(10), 1319-1335. doi:10.1080/00140139.2017.1288272
10. Christina, S., Dainty, A., Daniels, K., Tregaskis, O., & Waterson, P. (2017). Shut the fridge door! HRM alignment, job redesign and energy performance. *Human Resource Management Journal*, 27(3), 382-402. doi:10.1111/1748-8583.12144
11. Haslam, R., & Waterson, P. (2013). Ergonomics and Sustainability. *Ergonomics*, 56(3), 343-347. doi:10.1080/00140139.2013.786555
12. Davis, M. C., & Coan, P. (2015). Organizational Change. In J. Barling & J. L. Robertson (Eds.), *The Psychology of Green Organizations* (pp. 244-274). New York, NY: Oxford University Press.
13. Challenger, R., Clegg, C. W., & Robinson, M. A. (2009). *Understanding crowd behaviours: Supporting evidence*. London: Crown.
14. Hughes, H.P.N. (2017) *The role of advice networks in the design and development of jobs*. PhD thesis, University of Leeds.
15. Fletcher, C. & McDowall, A. (2014). Were 8 great? Doing more with less! An introduction to the new OP curriculum. Paper presented at the British Psychological Society's Division of Occupational Psychology Conference, Brighton, UK.