v2

A critical engagement with excellence in engineering education:
Centering powerful knowledge, teaching and learning

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VIRGINIA TECH

Language matters.
How we talk about engineering education reflects
how we think about engineering education
How we conceptualize our world influences our ability
to understand the present and
to know how to effect change in the future (where needed).

Vygotsky, L. S. (1962). *Thought and language*. New York: Wiley.
Lakoff, G., & Johnson, M. (1980). *Metaphors we live by.* Chicago: The University of Chicago Press.

This talk

1. What do we mean by excellence?
2. What do we mean by student engagement?
3. What do we mean by knowledge?
4. What is the relationship between the engineering degree and the engineering career?
5. Can we move beyond a psychological view on student learning?
6. What is the role of teaching?

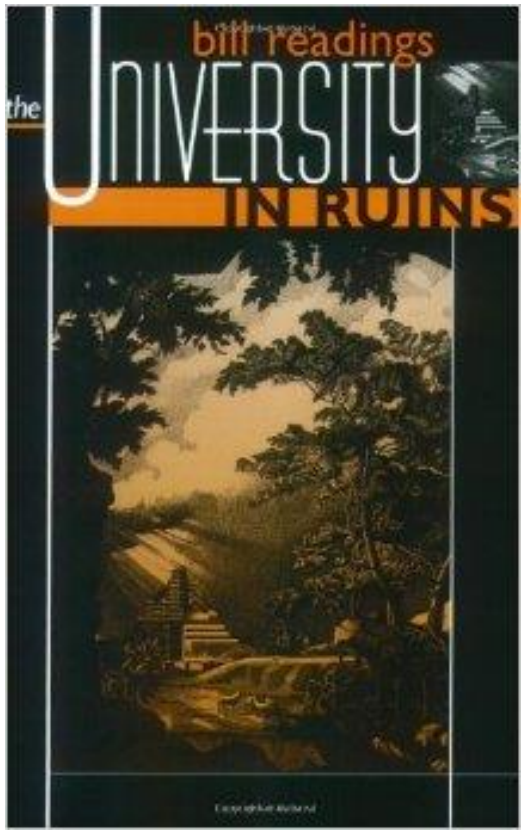
Full text at
https://bit.ly/2yTR0Hg

What needs to be in the engineering degree:

- Lifelong learning
- Ethics
- A few technical details

REALLY??

excellence



Three phases of the modern university:

1. Centred on Reason (Kant)
2. Centred on Culture (Humboldt)
3. Centred on … (“Excellence”)

As an integrating principle, excellence has the singular advantage of being entirely meaningless, or to put it more precisely, non-referential.

Readings, B. (1996). *The university in ruins*. Cambridge, MA: Harvard University Press, p. 22.

engagement

Teaching in Higher Education
Vol. 12, No. 1, February 2007, pp. 119–133

Routledge
Taylor & Francis Group

Alienation and engagement: exploring students' experiences of studying engineering

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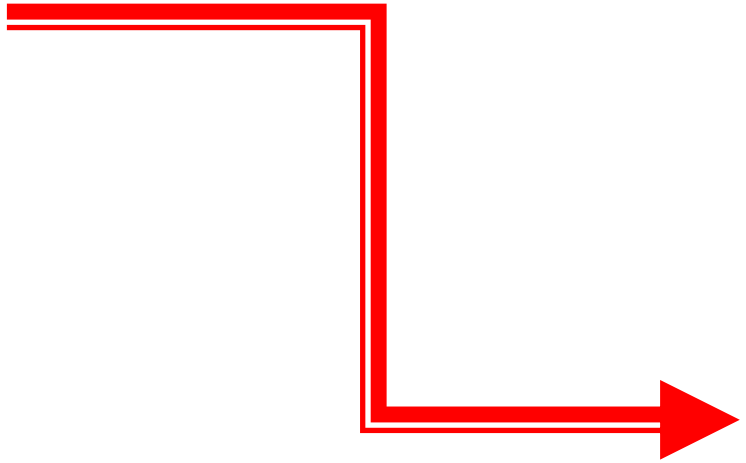
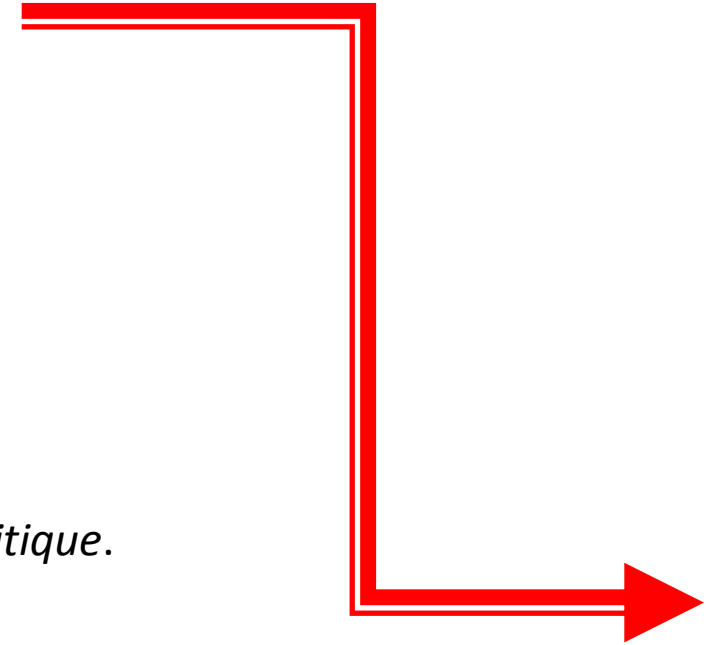
This article reports on an investigation of students' experiences of learning, using a framework that focuses on the concepts of alienation and engagement. Thirty-six third year chemical engineering students were interviewed about their learning experiences. Alienation is defined here as the absence of a relationship that students might desire or expect to experience. Using this focus, six possible 'relationships' were identified: to one's studies; to the broader university life; to home; to the career; to one's classmates; and to the lecturer. In each category a range of both alienated and engaged experiences were identified. With regard to the latter two categories, important de-alienating strategies were noted, and in particular the role that lecturers can play in facilitating these strategies.

knowledge

Knowledge in the discipline / profession

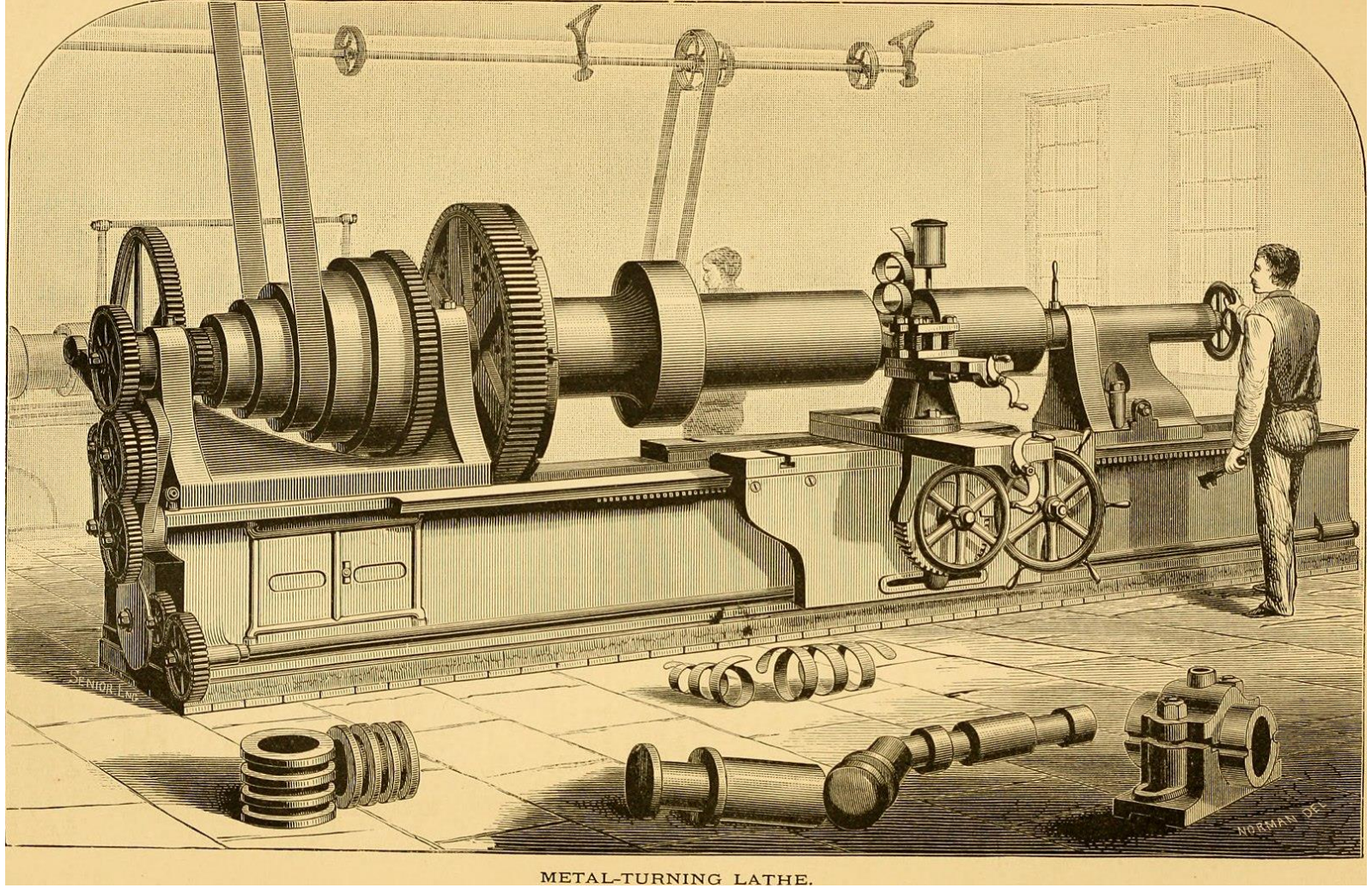


Knowledge in the curriculum



Knowledge in the classroom

Bernstein, B. (2000). *Pedagogy, symbolic control, and identity: Theory, research, critique*. Lanham, Maryland: Rowman & Littlefield Publishers.



METAL-TURNING LATHE.

$$r_n = a_{n-1} e^{-\lambda_r t_r} + r_\infty (1 - e^{-\lambda_r t_r})$$

$$a_n = r_n e^{-\lambda_r t_a} + a_\infty (1 - e^{-\lambda_a t_a})$$

where

$$\lambda_r = k_r[D] + l_r \qquad r_\infty = \left(1 + \frac{l_r}{k_r[D]}\right)^{-1}$$

$$\lambda_a = k_a[D] + l_a \qquad a_\infty = \left(1 + \frac{l_a}{k_a[D]}\right)^{-1}$$

Case, J. M. (2017). The historical evolution of engineering degrees: Competing stakeholders, contestation over ideas, and coherence across national borders. *European Journal for Engineering Education, 42*(6), 974-986.

engagement with knowledge

10 years on, what did an engineering degree give you?

- Confidence to tackle problems
- Engineering approach to problem solving
- Working independently
- Ability to learn new knowledge

Case, J. M., & Marshall, D. (2016). Bringing together knowledge and capabilities: A case study of engineering graduates. *Higher Education, 71*(6), 819–833. doi:10.1007/s10734-015-9932-4

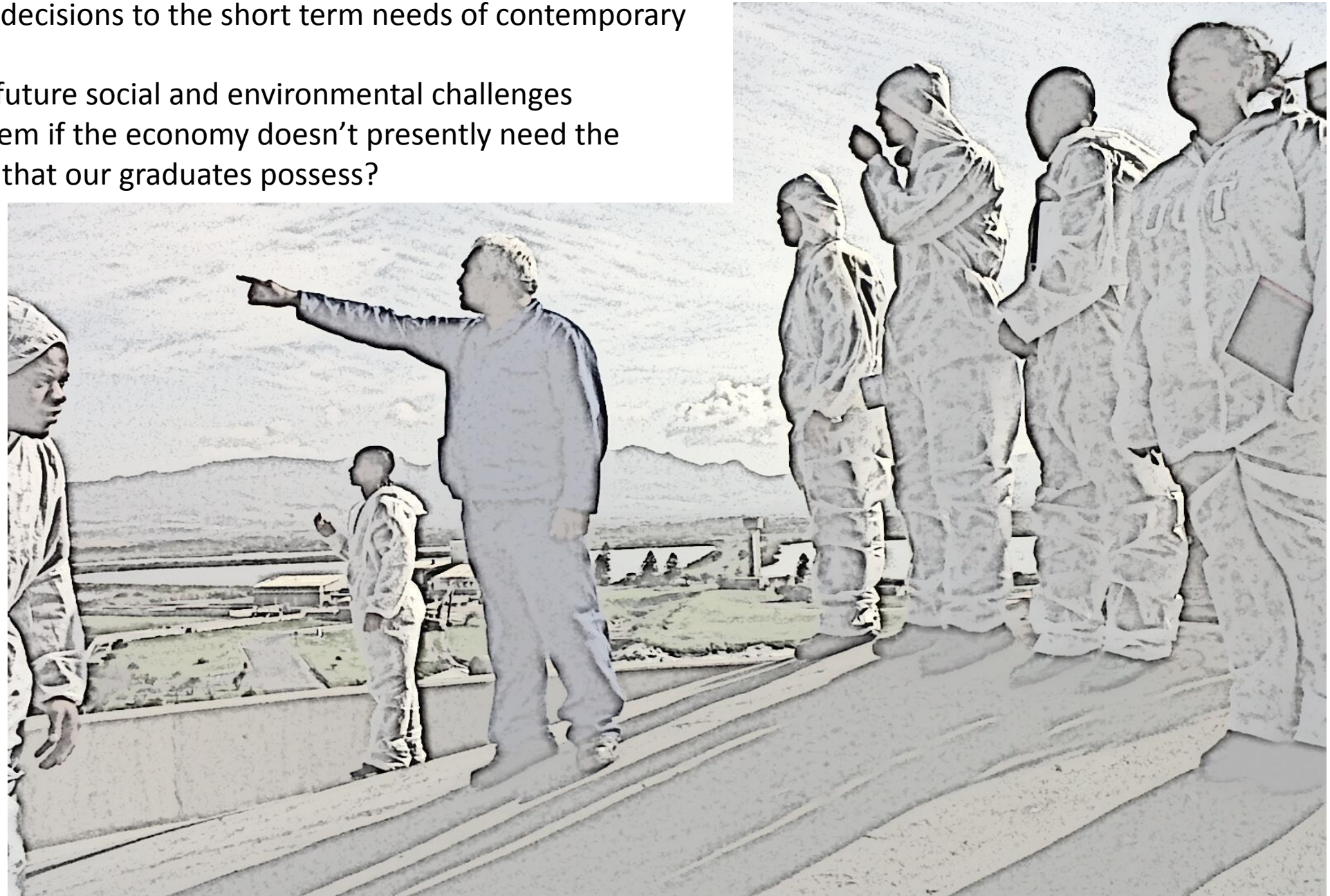
powerful knowledge

Wheelahan, L. (2012). *Why knowledge matters in curriculum: A social realist argument*. Abingdon, UK: Routledge.

relation between engineering degree and engineering career

- Does the engineering degree have a purpose beyond economic terms?
- Can we produce perfectly ‘job-ready’ graduates?
- Should we simply take prescriptions from the business world on what they need?
- Can’t specify the knowledge base for each engineering job – this is why we certify on outcomes

- Importance of engineering knowledge – do not subvert our curriculum decisions to the short term needs of contemporary capitalism
- Significant future social and environmental challenges
- Is it a problem if the economy doesn't presently need the knowledge that our graduates possess?



beyond a psychological view on student learning

PSYCHOLOGIZED

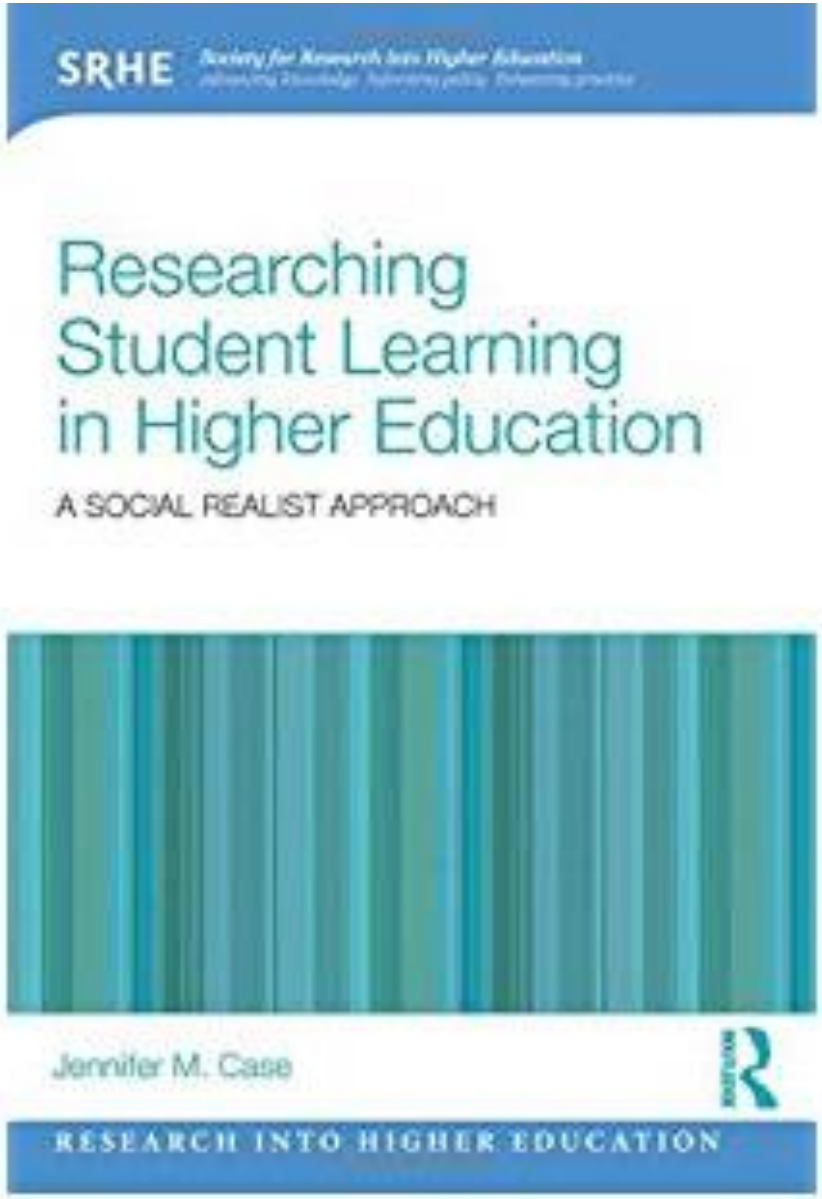
LANGUAGE

IN

Denaturalising a Regime of Truth

Zoi Bekerman and Michalinos Zembylas

EDUCATION



the role of teaching

Nature of the teaching-learning interaction

- Centred on knowledge
- Centred on the possibility of learning

Case, J. M. (2015). Knowledge for teaching, knowledge about teaching: exploring the links between education research, scholarship of teaching and learning (SOTL) and scholarly teaching. *Journal of Education, 61*, 53-72.
Case, J. M. (2015). Emergent interactions: Rethinking the relationship between teaching and learning. *Teaching in Higher Education, 20*(6), 625-635.

Acknowledgements

- Department of Chemical Engineering, University of Cape Town
- National Research Foundation, South Africa
- Centre for Global Higher Education, UK