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

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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).

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

Three phases of the modern university:
1. Centred on Reason (Kant)
2. Centred on Culture (Humboldt)
3. Centred on ... (“Excellence”)
engagement
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


\[ r_n = a_n - 1 \cdot e^{-\lambda r n} + r_\infty (1 - e^{-\lambda r n}) \]

\[ a_n = r_n e^{-\lambda r a} + a_\infty (1 - e^{-\lambda r a}) \]

where

\[ \lambda_r = k_r [D] + l_r \]

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

\[ \lambda_a = k_a [D] + l_a \]

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

powerful knowledge

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
the role of teaching
Nature of the teaching-learning interaction

• Centred on knowledge
• Centred on the possibility of learning


Acknowledgements

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