

On one A4

David Goldberg & Mark Somerville – A Whole New Engineer (2014)

This book is a compelling, inspiring and convincing pamphlet about the need for and way to transforming engineering education. It describes lessons learned from two very differently contexted USA pilots: Olin Engineering College and iFoundry. And it builds on bodies of knowledge about e.g. mindsets, positive psychology, intrinsic motivation and joy. It breaks away from the traditional focus on content, curriculum and pedagogy, and posits a change of view on change management.

| Problems to be solved | What Olin and iFoundry did | Seven key take-aways |
|--|---|---|
| <p>In today's engineering education there are two main problems.</p> <p>One is, that for several decades leaders underline the need to change engineering education (EE).</p> <p>The second is, that current EE is outdated, incomplete, insufficient and unattractive. Society and business have transformed, but EE hasn't. EE still is organized as if knowledge is expensive instead of a commodity.</p> | <ul style="list-style-type: none"> <input type="checkbox"/> Teachers were attracted via opt-in, based on a new vision and shared beliefs <input type="checkbox"/> Students: idem <input type="checkbox"/> Student-Driven Learning was chosen. Students were truly considered to be partners; intrinsic motivation <input type="checkbox"/> When things didn't work out, teachers and students worked together to find solutions <input type="checkbox"/> Setting up an educational programme is a design project, but not a modern-day one. It's not rigorously plannable, but effectual, i.e. step-by-step <input type="checkbox"/> Connectedness in community <input type="checkbox"/> Use of sticky language and specific reframing, like the three joys, and the missing basics. | <ol style="list-style-type: none"> 1. Engineering education is misaligned with the twenty-first century. 2. The twenty-first century calls for courageous, not obedient, engineers. 3. The cultivation of courage requires trust. 4. Training educators to show up as coaches who trust is a deep emotional shift. 5. Moving educational institutions formed as impersonal bureaucracies to become more democratic and caring is a deep cultural shift. 6. New understandings of brain, social and organizational science give us the tools and technologies for deeply emotional and cultural transformations. 7. The necessary change is too complex and emotionally and culturally challenging to do in competitive isolation from one another and requires collaboration. |

This book pictures a journey, and is not a book on educational research. It does, however, use and synthesise from scientific sources, like Carol Dweck and Carl Rogers. Clearly, the book is about the USA context, although TU Delft and UT – ATLAS – are referred to as well. The authors focus on *engineering* education, but I feel that it is relevant throughout. It could be a major source for reviving TOM!



We can become a member.

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Some more detail

Key Lessons for Change

- The importance of Pivotal Moments
- High student engagement (Student-Driven Learning) is not more expensive than the traditional 'Sage on the Stage'
- The past is not the future
- We need to move from a model of 'time served' to a model of 'stuff learned'
- The current classroom is an educational factory; the teacher is a manager seeking maximum performance
- Content, curriculum and pedagogy are not enough
- Culture is like an immune system. We need to create a new culture
- Change requires three components: emotion, reason and process

- Build the community, not just the curriculum
- Don't just tell me. Show me; let me experience it. (includes coaching)
- Unleash students for change.
- Choose your words carefully.
- You can't just tick a box.
- You don't have to know where you're going

- We need collaborative disruption

Carl Rogers' picture in *Freedom to Learn*

- 'The student cannot be trusted to pursue his own scientific and professional learning'
- 'Ability to pass examinations is the best criterion for student selection and for judging professional promise'
- 'Presentation equals learning. What is presented in a lecture is what a student learns'
- 'Knowledge is the accumulation of brick upon brick of content and information'
- 'Creative scientists develop from passive learners'
- 'Students are best regarded as manipulable objects, not as persons'

Intrinsic motivation is about ...

- Making meaningful choices
- Autonomy
- Relatedness
- Competence / Mastery
- Purpose

Five pillars of educational transformation

1. Joy (in what you do)
2. Trust
3. Courage
4. Openness
5. Connectedness, collaboration, community

A Whole New Engineer has 'Six Minds'

1. Analytical
2. Design
3. Linguistic
4. People
5. Body
6. Mindful

Historical development of engineering

- Circa 1946: knowledge was expensive and hard to get. Return on expertise was high. Organizations were large and integrated
- Since then, universities missed out on three revolutions:
 - Entrepreneurial
 - Quality
 - IT
- Plus: two new laws of economics: transaction costs greatly reduced, and increasing returns to networked goods