Strategies for excellence in engineering education: developments in global best practice

13th June 2024
SEFI Deans Convention 2024

Dr Ruth Graham

Outline of session

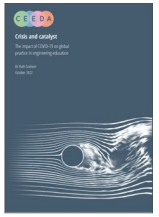
What

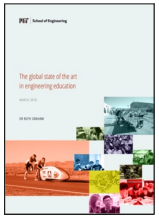
1. Emerging global best practices in engineering education

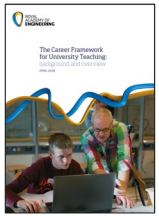
How

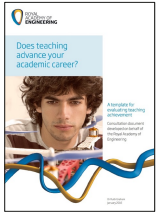
2. Facilitators of educational change

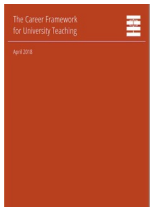
3. Global shift in how teaching is rewarded in academic careers

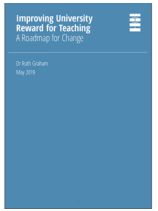




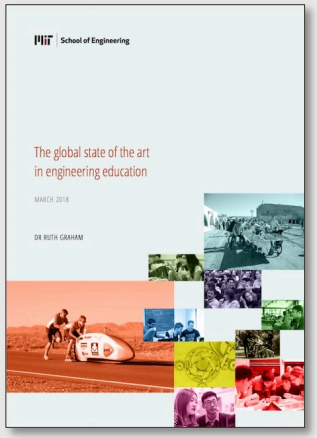








The global state of the art in engineering education

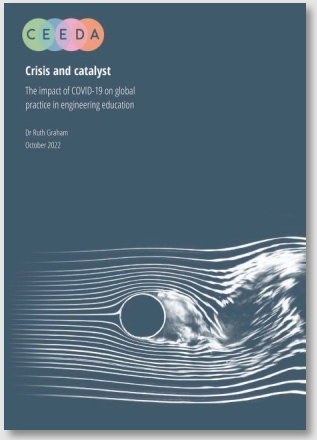


Commissioned by MIT

178 interviewees from 18 countries

Published March 2018

Crisis and catalyst: the impact of COVID-19 on global practice in engineering education



Sponsored by university consortium

226 interviewees from 36 countries

Published Oct 2022

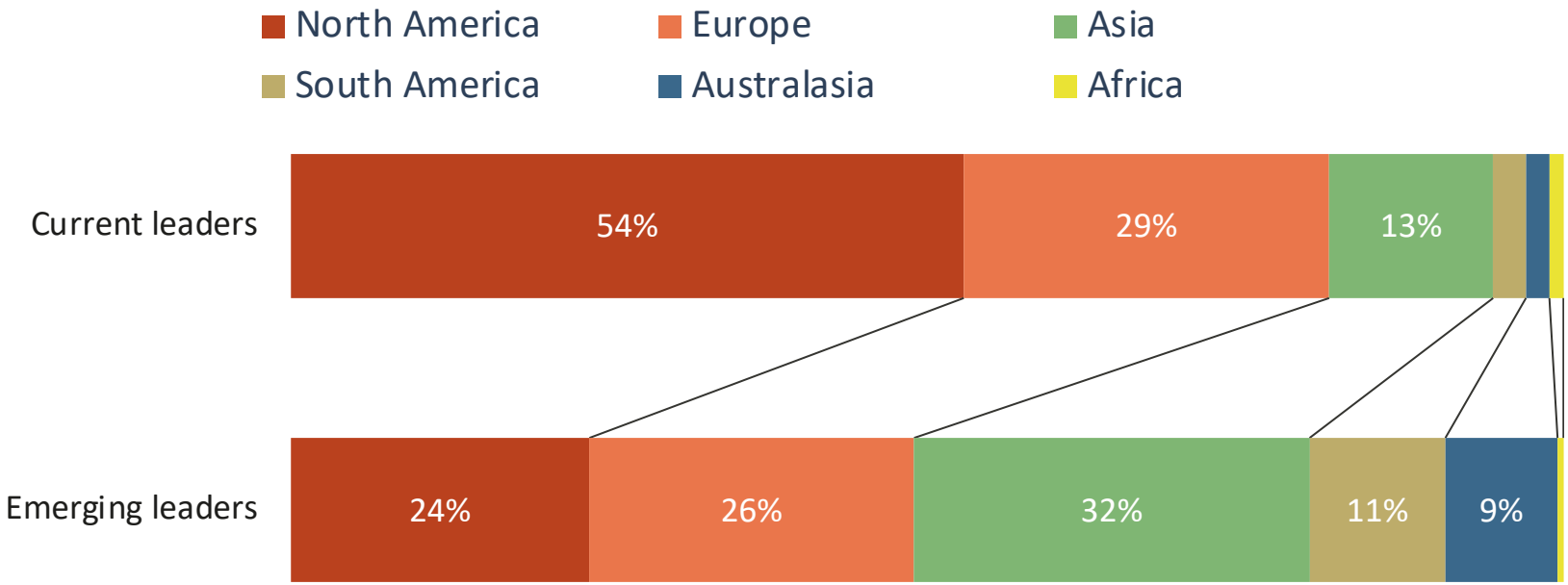
The 10 institutions most frequently identified as **current leaders** in engineering undergraduate education

1	Olin College (US)
2	MIT (US)
3	Stanford Uni (US)
4	Aalborg Uni (Denmark)
5	TU Delft (Netherlands)
6	UCL (UK)
7	Purdue Uni (US)
8	NUS (Singapore)
9	Uni of Cambridge (UK)
10	Chalmers Uni (Sweden)

The 10 institutions most frequently identified as **emerging leaders** in engineering undergraduate education

1	SUTD (Singapore)
2	Olin College (US)
3	UCL (UK)
4	PUC (Chile)
5	Iron Range (US)
6	NUS (Singapore)
7	TU Delft (Netherlands)
8	Charles Sturt (Australia)
9	Tsinghua (China)
10	Arizona State (US)

The locations of **current** and **emerging** leaders:



Key emerging themes amongst globally-recognized programmes:

1. Offering authentic active, experiential learning at scale
2. Fostering student mindsets, such as identity and wellbeing
3. Delivering integrated and interconnected programs that progressively build student competencies
4. Offering diverse and flexible student assessment
5. Educating socially and environmentally responsible change-makers
6. Offering student choice, flexibility and multi-disciplinary learning

Example 1: Aalborg University (Denmark)

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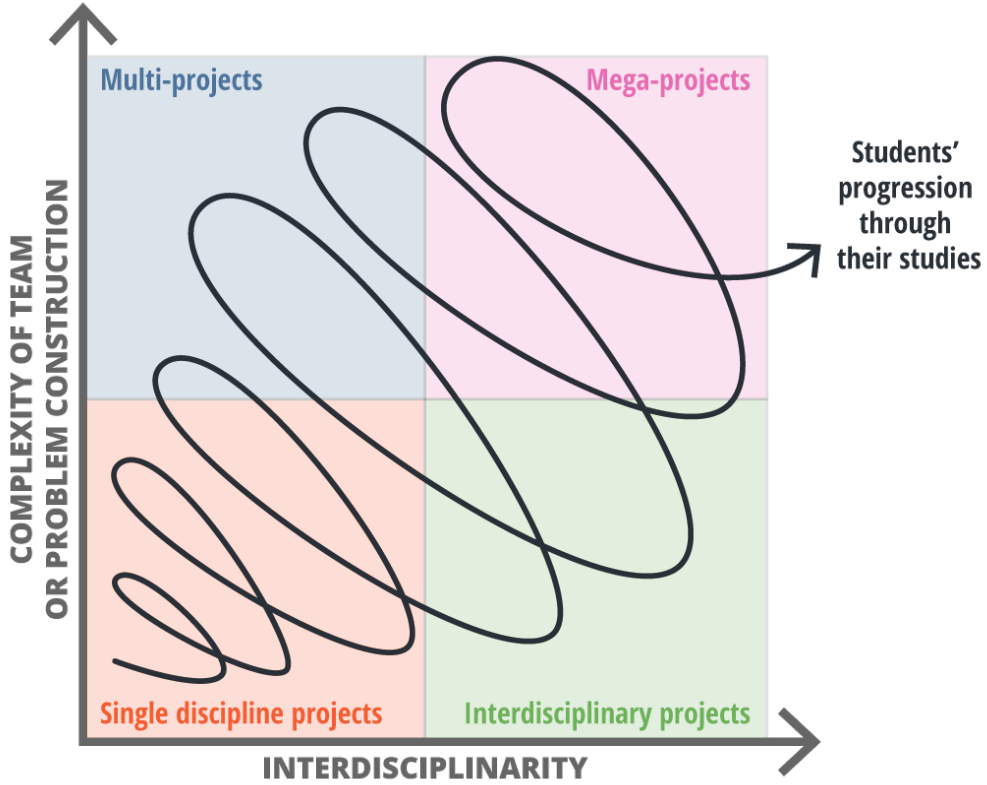

Increasing project complexity

Building in complexity – technical, societal and inter-disciplinary – as students progress. Culminating in 'mega-projects' in final years of study.

Mindset development

Nurturing and tracking progressive learning outcomes (*PBL Competencies*), guided by structured self- and peer-reflection sessions.

Example 2: Tec de Monterrey (Mexico)

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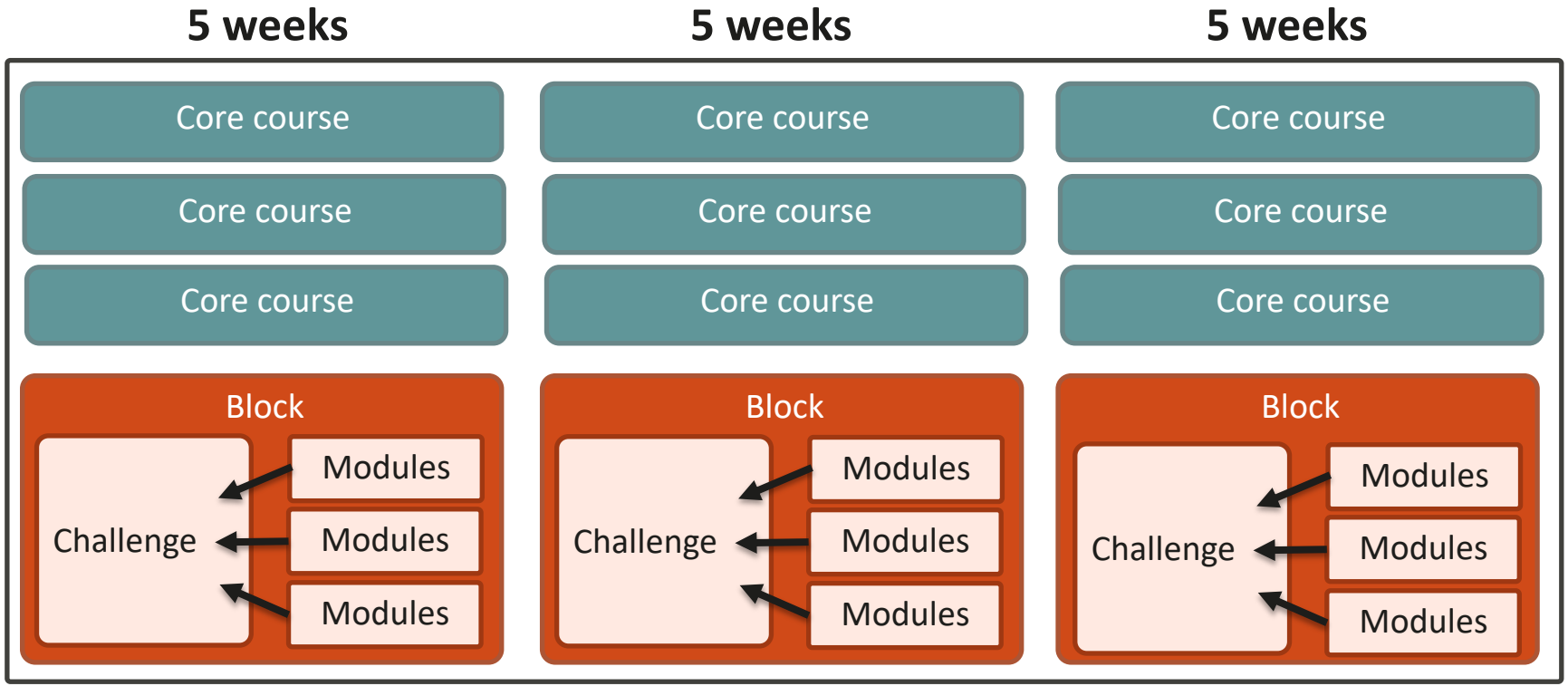

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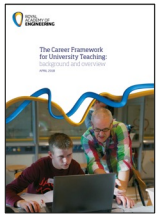

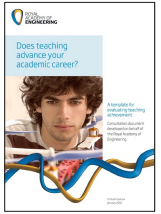

Common features amongst next generation of leading programmes:

1. **Leadership and vision:** effective leadership that promotes clear vision

Leadership and vision: Arizona State University (ASU)

ASU: President Michael Crow

The educational transformations at Arizona State University (US) has been focused specifically on supporting the health, opportunity and economic development of the state of Arizona, with initiatives supporting community engagement, flexible online learning and workforce development.

Common features amongst next generation of leading programmes:

1. **Leadership and vision:** effective leadership that promotes clear vision
2. **Evidence-informed practices:** robust pedagogical training and support; learning from research and evidence-informed practices

Aalborg University: IAS-PBL

Tec de Monterrey: Institute for the Future of Education

Common features amongst next generation of leading programmes:

1. **Leadership and vision:** effective leadership that promotes clear vision
2. **Evidence-informed practices:** robust pedagogical training and support; learning from research and evidence-informed practices
3. **Collegiality:** collaborations at all levels of the university
4. **New educational technologies:** developing and adopting new educational technologies
5. **Flexible systems and resourcing:** breaking down silos (e.g budgetary or disciplinary) and flexibility in government/regulatory requirements
6. **Rewards systems:** incentivizing excellence and innovation in teaching

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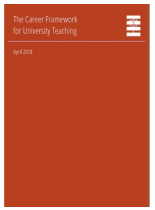
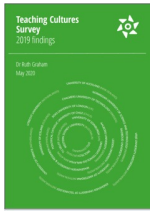
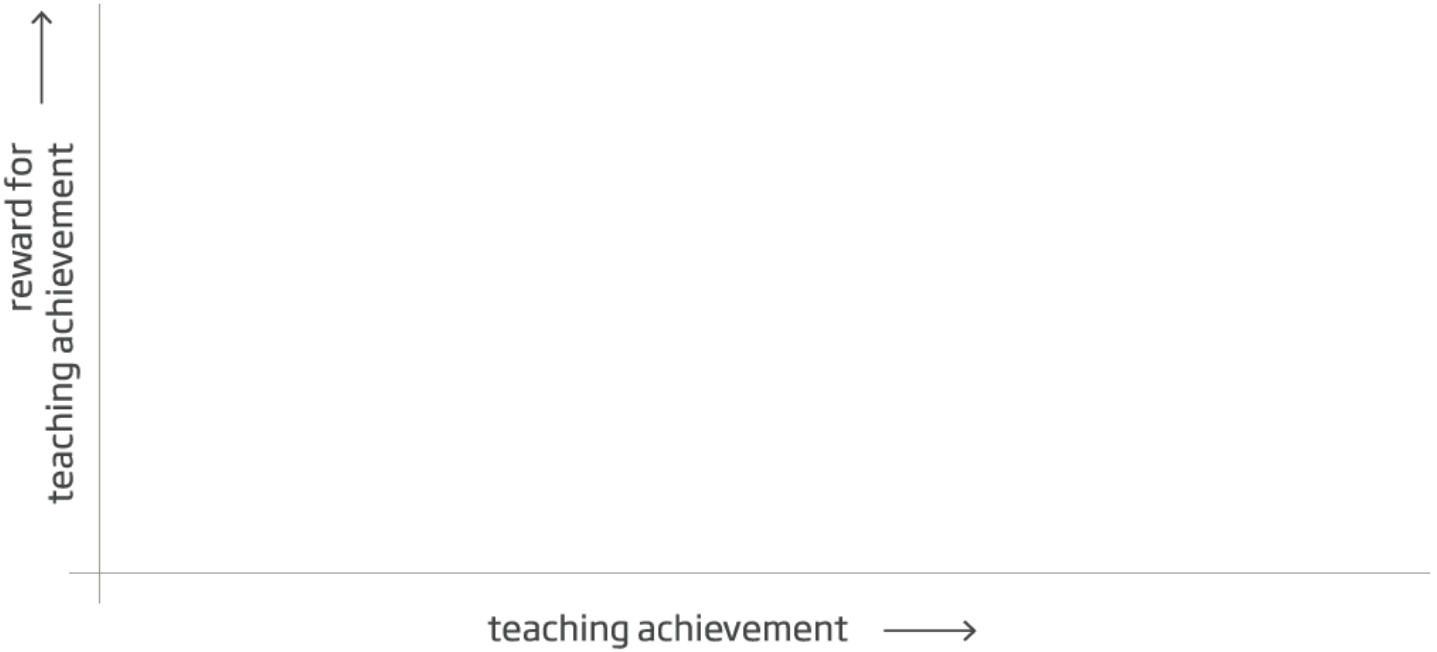
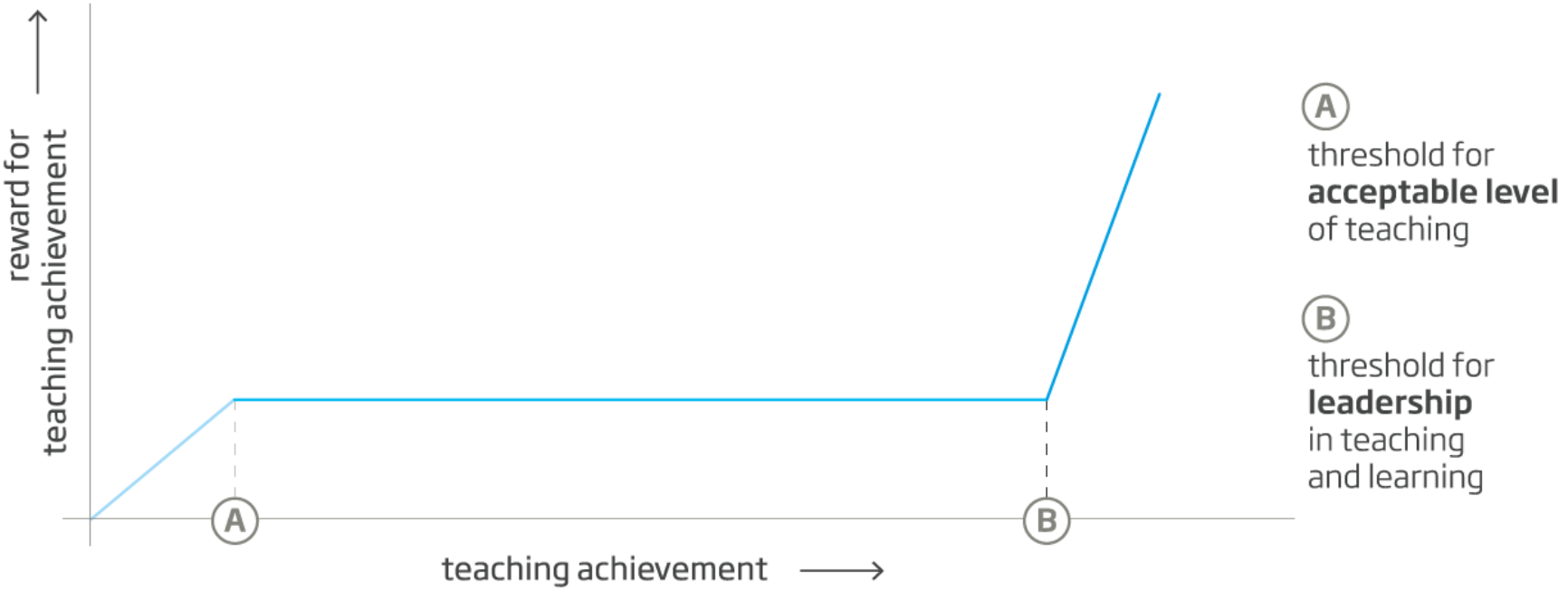





reward for
teaching achievement
teaching achievement


reward for
teaching achievement
A
B
teaching achievement
A
threshold for
acceptable level
of teaching
B
threshold for
leadership
in teaching
and learning

Challenges:

- the absence of clear and accepted **definitions** of progressive ‘levels’ of teaching achievement that punctuate each stage of the career ladder
- the inadequacy of the forms of **evidence** currently used to demonstrate and evaluate the teaching contribution of academics at each stage in their career progression
- a clear **commitment to change** that is supported by university leadership, unions/senate and the wider academic community

Global mapping:

Mapping the global movement for change to the reward of university teaching and showcasing best practice solutions from across the world

October 2023 – October 2024

Interviewees to date: 107 from 22 countries

Dr Ruth Graham

Institutional reform: UCL (UK)

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UCL Academic Careers Framework

In 2017, UCL launched its Academic Careers Framework for 2017/18 promotion round.

The Framework focuses on the candidate's impact across four domains: teaching, research, institutional citizenship and enterprise/external engagement. Candidates must identify which of these four domains is: a **threshold** ability, a **core** ability and an **extended/specialist** ability.

UCL are currently working to improve annual appraisals and educational leadership track.

National collaborations for change:

- **Denmark:** following a bottom-up model for change to career pathways, led by Danish university leaders
- **Malaysia:** government-led initiative, asking all Malaysian universities to implement new academic career pathways
- **Norway:** development of ‘pedagogical merit’ system to support the reward of teaching
- **Netherlands:** ’bottom up’ collaboration, building on agreement of Rectors of Dutch research universities

National collaborations for change: Netherlands

National collaborations for change: Netherlands

Room for Everyone's Talent

Agreement by the Rectors of all 14 Dutch research universities, described as "*a new balance in the recognition and rewards for academics… includes placing less emphasis on the number of publications, and a greater emphasis on the other domains in which the academic is active, such as education and impact*".

Under development at all research universities since 2020 to drive parallel reforms to academic career pathways and reward systems.

Teaching Cultures Survey

2019:
15,659 participants

2022:
11,614 participants

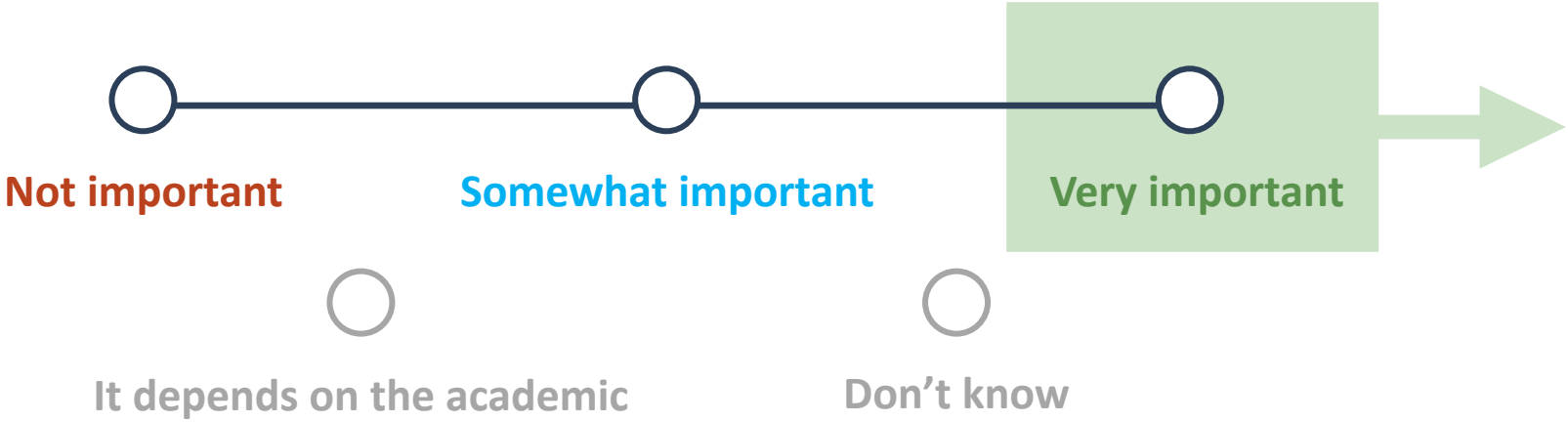
Academics experiences and priorities: promotion to full professorship

"How important **would you like** each of the following activities to be for promotion to full professor at your university (for a typical academic on a research/teaching contract)?"

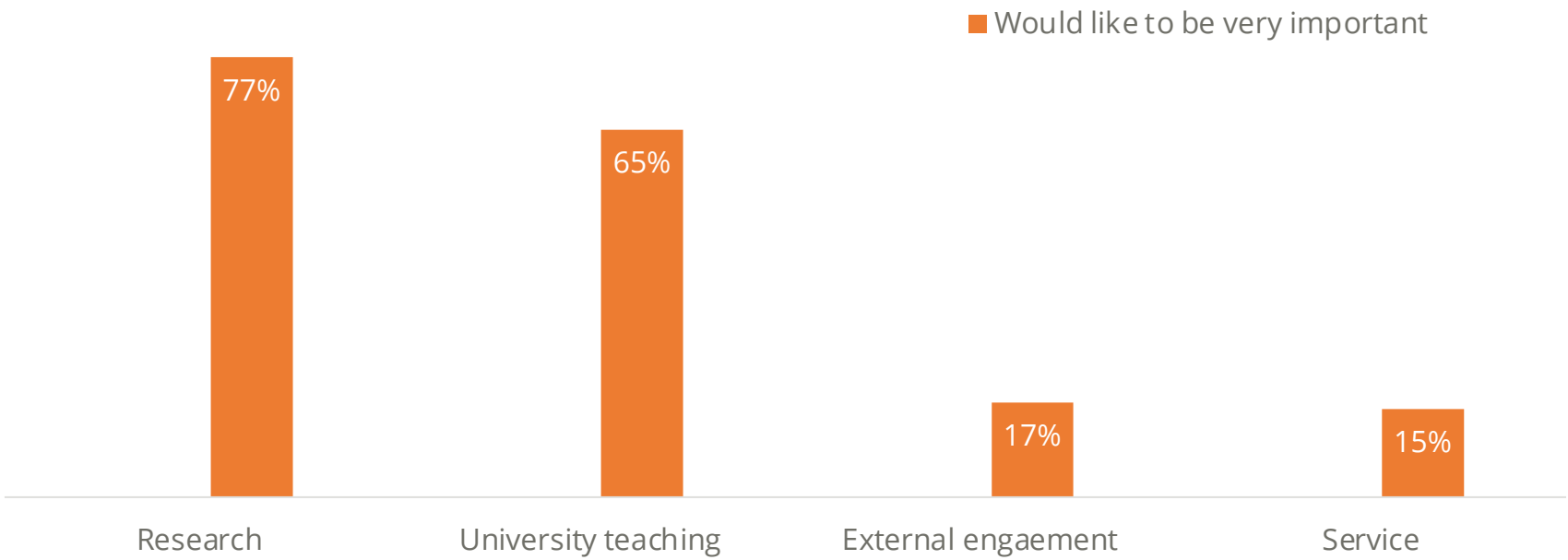
1. **university teaching**
2. **research**
3. **entrepreneurship**, enterprise & external engagement
4. **service** to the university / administration

Academics experiences and priorities: promotion to full professorship

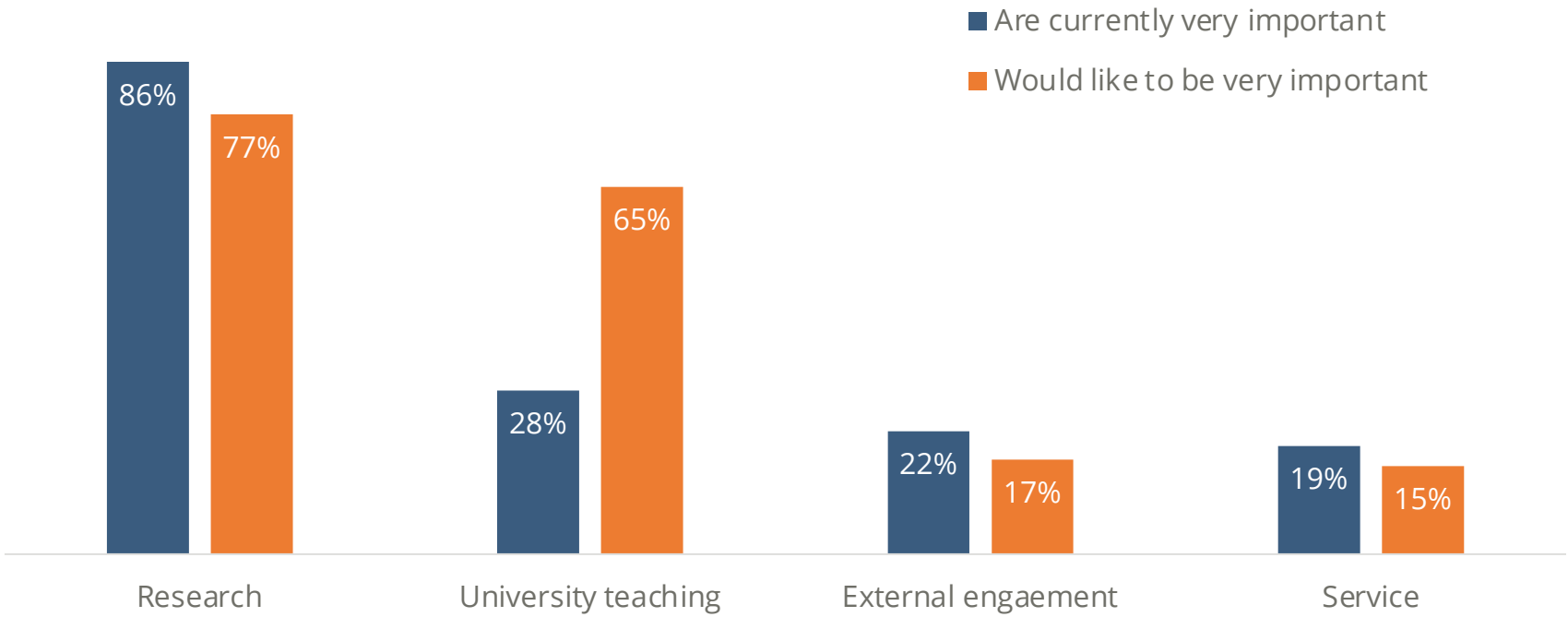
"How important **would you like** each of the following activities to be for promotion to full professor at your university (for a typical academic on a research/teaching contract)?"

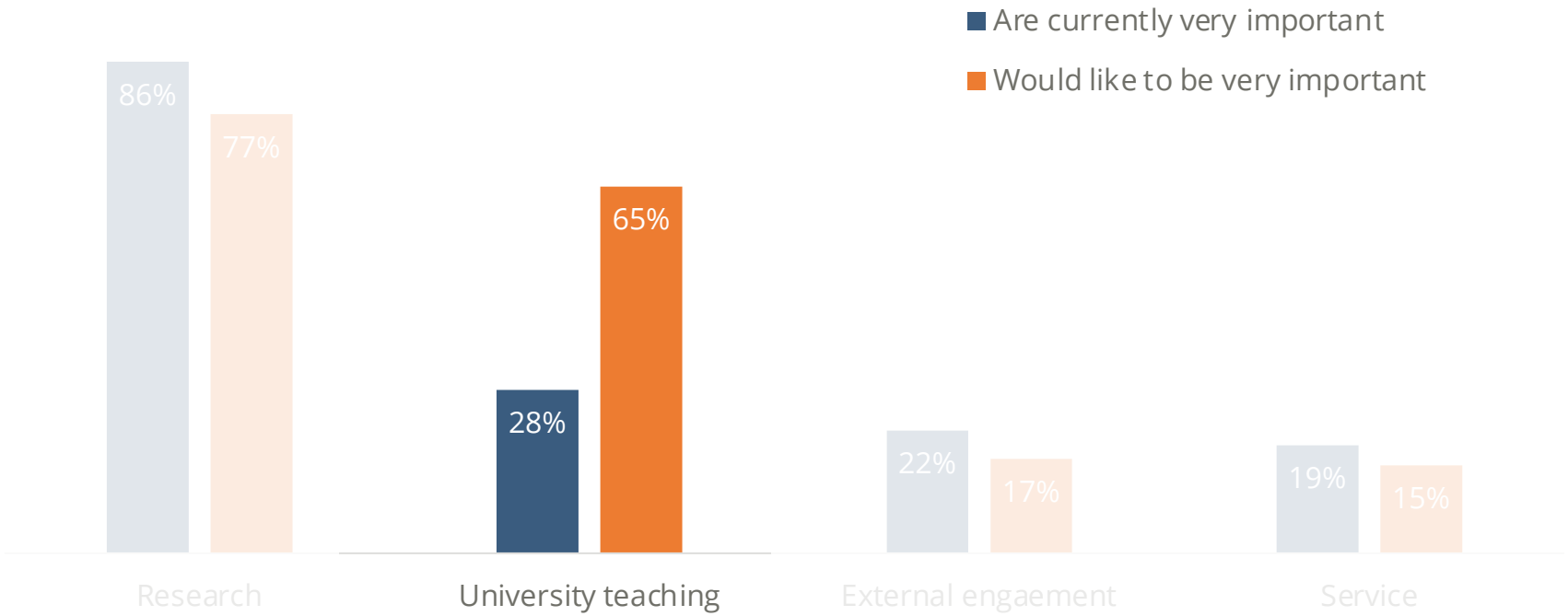


Respondents who would like each activity to be very important ....



… respondents who report each activity currently is very important




Are currently very important
Would like to be very important
86%
77%
28%
65%
22%
17%
19%
15%
Research
University teaching
External engaement
Service

AALBORG UNIVERSITY
DENMARK
UNIVERSITEIT VAN AMSTERDAM
THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND
CHALMERS
UNIVERSITY OF TECHNOLOGY
DTU
THE UNIVERSITY of EDINBURGH
TU/e
EINDHOVEN UNIVERSITY OF TECHNOLOGY
KING'S College LONDON
Universiteit Leiden
Maastricht University
NTNU
Norwegian University of Science and Technology
Radboud Universiteit
Skoltech
Skolkovo Institute of Science and Technology
SOAS
University of London
TU Delft
UCL
UNIVERSITY OF TWENTE.
UNIVERSITY OF ICELAND
UTM
UNIVERSITI TEKNOLOGI MALAYSIA
Utrecht University
VU
VRIJE UNIVERSITEIT AMSTERDAM
WAGENINGEN
UNIVERSITY & RESEARCH
WESTERN SYDNEY
UNIVERSITY

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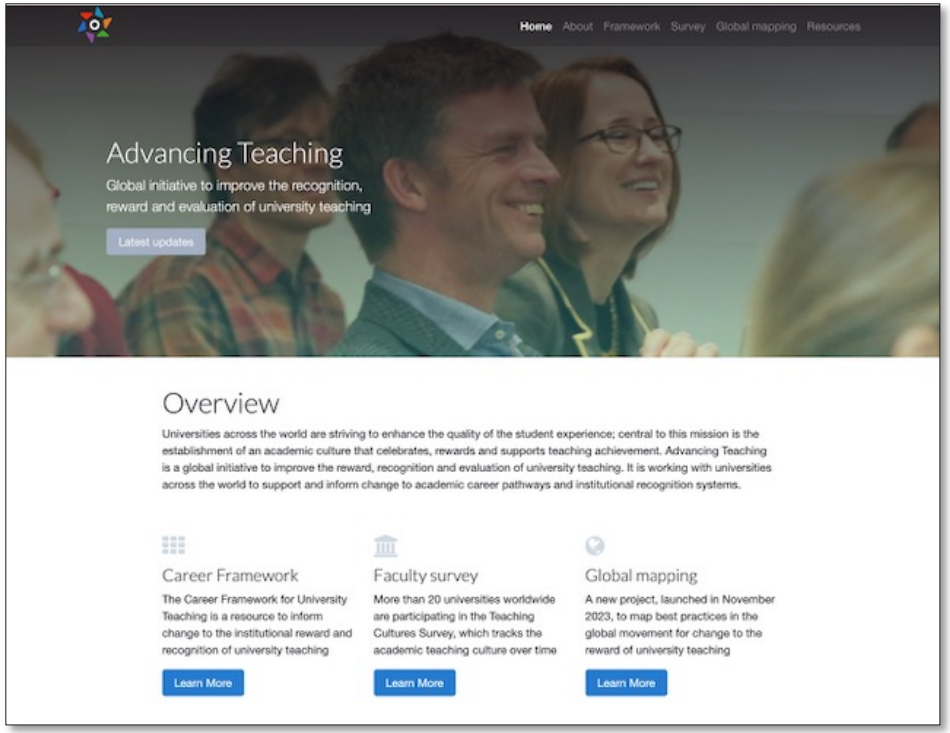

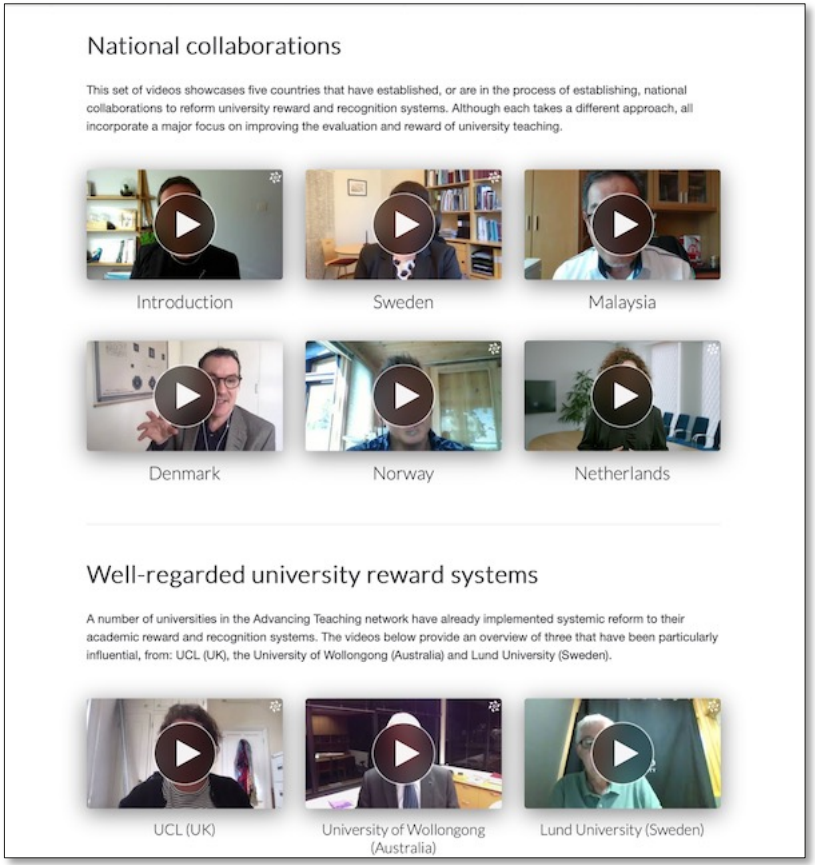

www.advancingteaching.com

Thank you

Publications:

Links to all the publications highlighted can be found at:

1. **Dr Graham's website: www.rhgraham.org/reports**
2. **Advancing Teaching: www.advancingteaching.com/resources**