

New Model

in Technology
& Engineering

A view (or provocation) from Hereford



Professor Peter Goodhew CBE, FREng

NFEC: November 2018



New Model

in Technology
& Engineering

New Model in Technology and Engineering (NMITe)

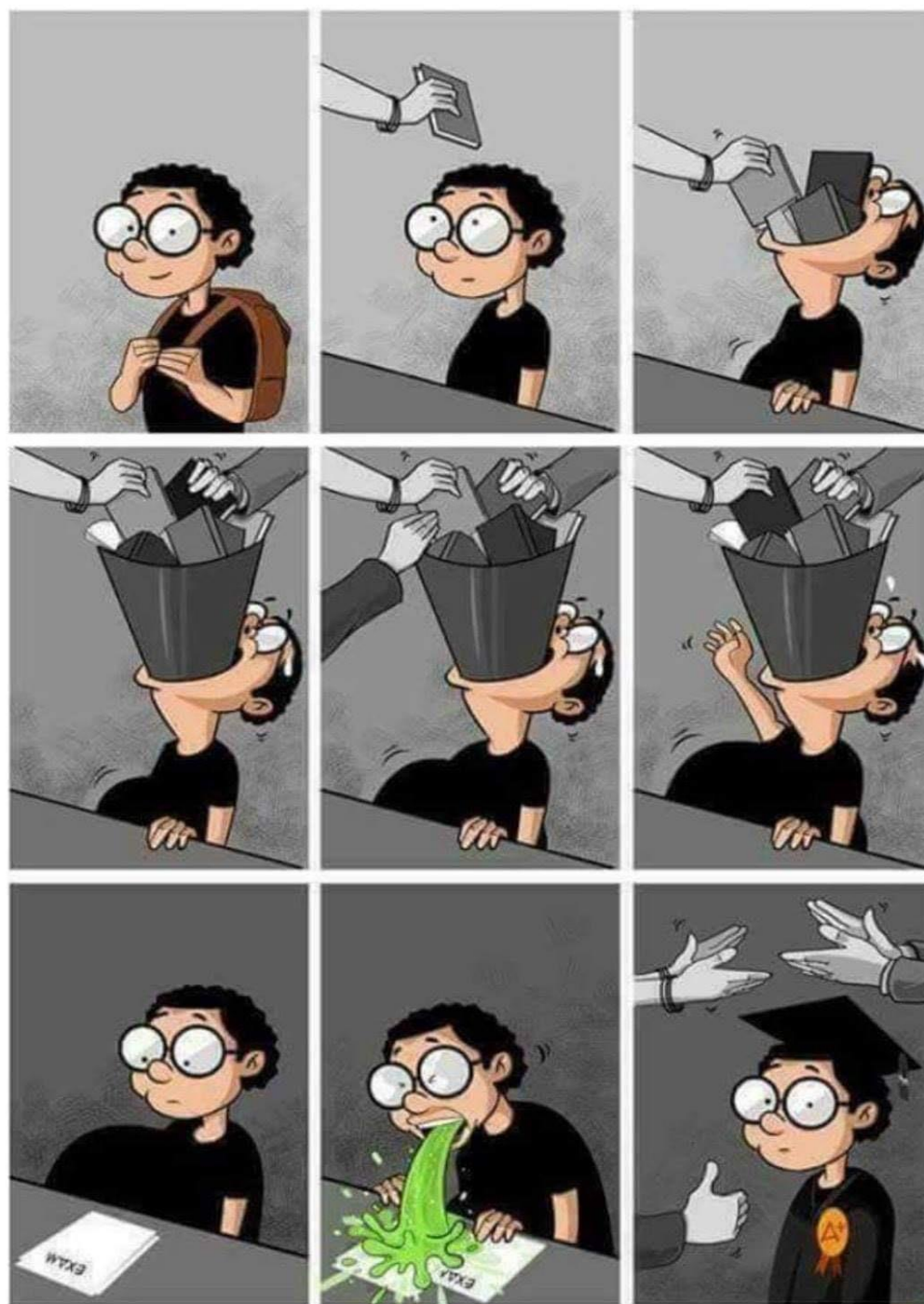
A university in the making for Hereford

A decorative graphic consisting of three overlapping, wavy lines in shades of blue, green, and light blue, extending horizontally across the lower half of the slide.

New Model

in Technology & Engineering

Not:



New Model

in Technology
& Engineering

In my youth I could believe
six impossible things before
breakfast

The White Queen, Lewis Carroll

Through the Looking Glass (1871)



Some assertions and suggestions

0. Education must not be vocational training, not least because graduates will have many careers during their 60 year working life.

Our programmes should inspire and build attitudes. Content is largely irrelevant.

Some assertions and suggestions

1. The vast majority of graduate engineers do not themselves use mathematics in their job.

Most undergraduate programmes should not require mathematics on entry.

Some assertions and suggestions

2. For the past 50 years we have been spectacularly unsuccessful in attracting women into engineering.

Disband WISE etc;
Instead of trying to change women to like engineering, we should change engineering to like women;
Some engineering departments should recruit equal numbers of men and women.

12% of 2012 graduates were female. WISE started in 1984. Even if effective it has only increased participation by at most 0.4% per year, which would take another 92 years to reach parity.

Some assertions and suggestions

3. Most people remember very few of the lectures they have attended.

Lectures should be given sparingly, and only to inspire.

Some assertions and suggestions

4. Only 4% of UK engineering graduates go on to do a PhD.

Abolish the PhD in engineering except as a mid-life vanity product.

Some assertions and suggestions

5. Very little teaching is genuinely “research-led” (even if you could define this).

Replace the mantra “research-led” by “practitioner-informed”.

Some assertions and suggestions

6. Relevance is ephemeral.
Fundamentals are eternal.

Ensure that there is a sensible balance between the “relevant”, which is exciting, and the “fundamental”, which will last a lifetime (and several careers).

Some assertions and suggestions

7. Knowledge is easily available everywhere; Understanding is both more important and requires nurture.

We should assess only understanding; Conventional exams are bad at this, so all assessment should be F2F.

[Knowledge will have to be deployed to demonstrate understanding, so there is no need to test it separately.]

Some assertions and suggestions

8. Liberal engineers will need well developed communication skills in English.

Forget IELTS and English GCSE;

The entry test should be a middling-difficulty cryptic crossword (eg The Observer's Everyman), combined with reading aloud from an unseen novel or poem.

This is a test of language and cultural reference;

Some assertions and suggestions

9. There will continue to be more Chinese engineers, and employers, than British.

Teach Mandarin;
Give some modules in Mandarin.

Some assertions and suggestions

10. Accreditation never saved a life.

Either ignore accreditation or lead it
in the right direction. Never let it
lead you.

New Model

in Technology
& Engineering

Inauguration in
Hereford Cathedral

19th October 2018

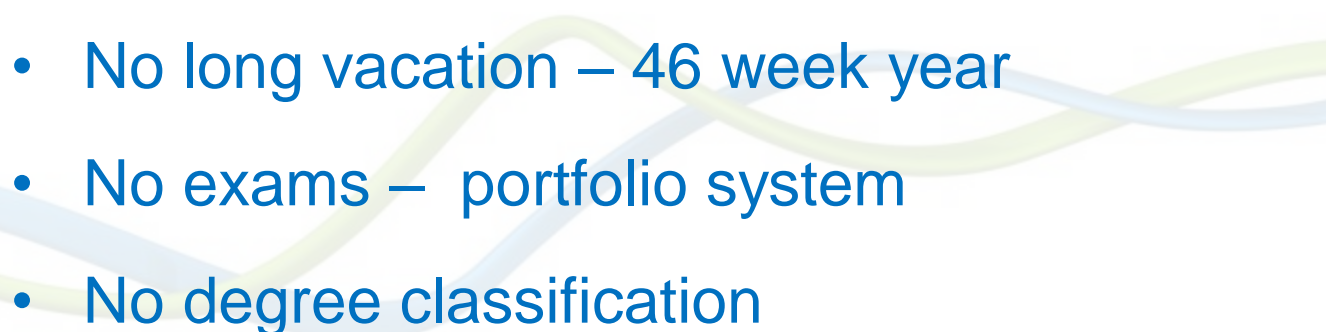


So how far have we got?



So how far have we got?

The six impossible things:

- No lectures – entirely project based
 - No requirement for maths or physics A level
 - No long vacation – 46 week year
 - No exams – portfolio system
 - No degree classification
 - Gender balance in staff and student bodies
- 

New Model

in Technology & Engineering

So how far have we got?

£23M +

A curriculum with 20 sprints

20 staff

Design cohort of 25

Some buildings

A validator



So how far have we got?

Some other difficult things:

- Validation by Warwick (discussions in progress)
- Accreditation by Eng Council (discussions ongoing)
- Student accommodation
- Links with Hereford College of Art (not difficult at all)
- Support from 20+ employers (maybe 100)
- Amazing enthusiasm
- Encouragement from local councils, government and Royal Academy of Engineering

New Model

in Technology & Engineering

So how far have we got?

A bit of outreach – Ingenuity Studio:



Some assertions and suggestions

Engineering makes people's lives better.

Sell engineering as an humanitarian vocation.

Some assertions and suggestions

Students should be prepared to define problems as well as work on their solutions¹.

PBL is not enough.²

1. Liberal Studies in Engineering: Workshop NSF/MIT
2. “A pound’s not enough” Julie Christie in Darling

Some assertions and suggestions

To replace engineering academics takes between 0.5 and 2% of our "output" of graduates.

Stop teaching as if we just want to clone ourselves.

Arithmetic (not maths):

Lower bound from SSR 20; academic life 40; 4 year programme = 1 in 200

Upper bound from SSR 10; academic life 20; 4 year programme = 1 in 50

New Model

in Technology
& Engineering

Over to you



... for questions, comments and debate!

Some assertions and suggestions

Education is not transfer of knowledge: It is a process which might result in changed attitudes.

Make content irrelevant, or at least secondary.