



We need to talk about **Maths...**

Nathalie van der Wal and McGraw-Hill Education

A visual representation on creating a maths course
designed to build the skills needed for the future

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We assume that many of these digital skills will be learned **'on the job'** as if by osmosis

But in reality, many employees will never receive adequate or advanced training and support in these areas unless they undertake additional self-funded study. As with any skill, they are usually only mastered when they have been taught explicitly.

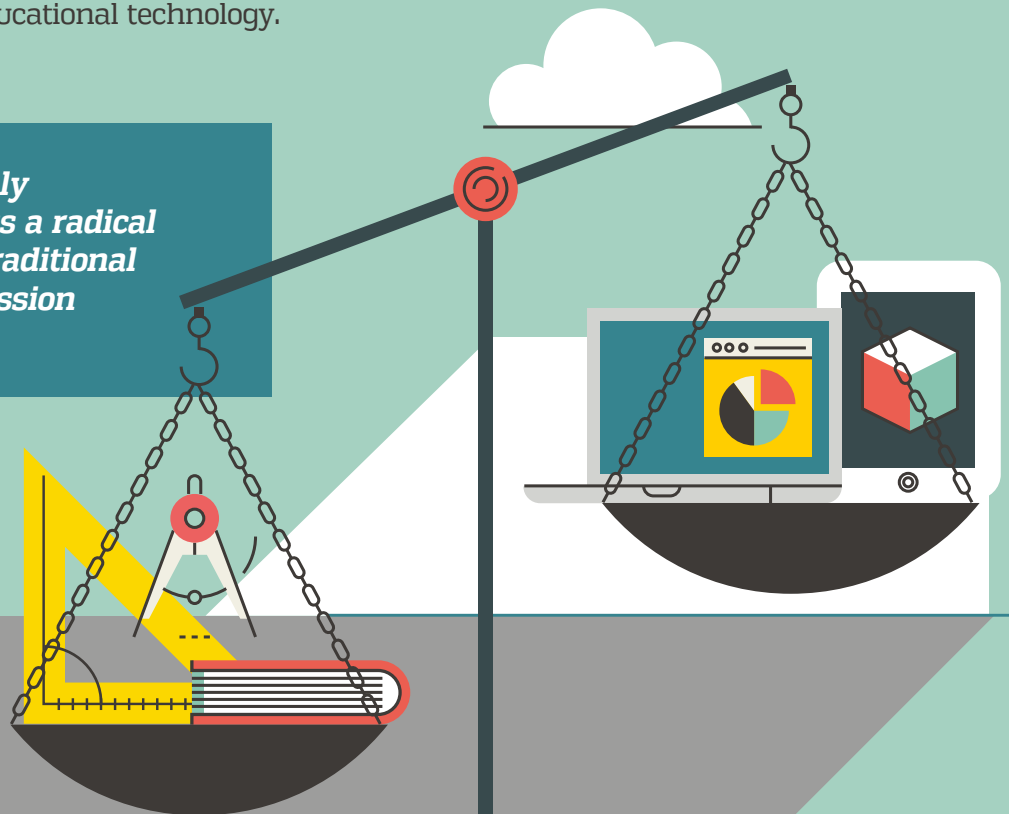


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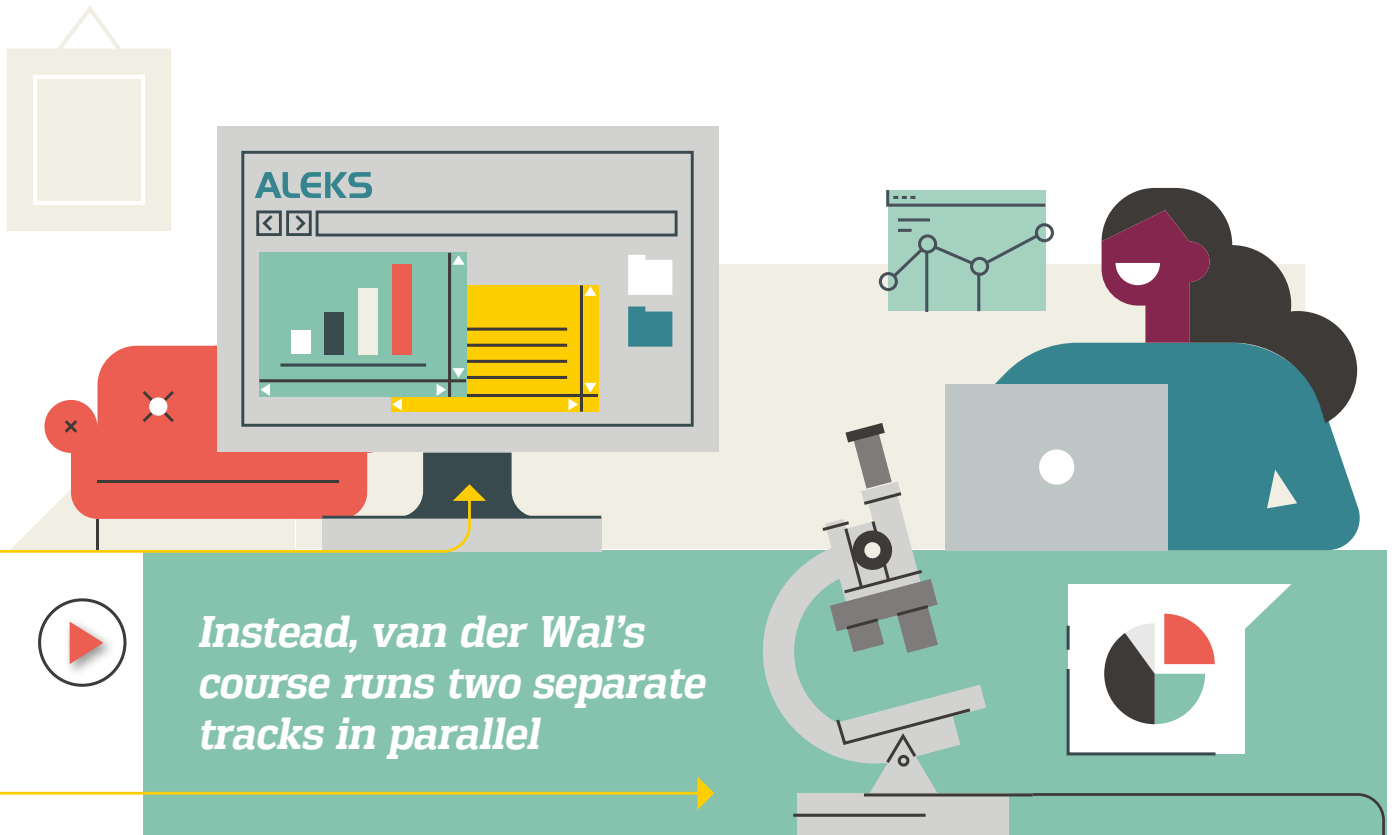
▶ ***Following on from this,*** Nathalie J. van der Wal and her team at the Utrecht University have been experimenting with a different type of maths course for first-year students across all technical domains.

The course she and her team have designed combines a firm base of pure maths with an equal focus on developing Techno-mathematical Literacies. It's a difficult balance to achieve, and one which has been enormously facilitated by educational technology.

The approach is highly innovative and marks a radical departure from the traditional approach of 'transmission lecturing.'



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Instead, van der Wal's course runs two separate tracks in parallel



With the first track, which focuses on the pure maths skills, students are expected to take responsibility for their own learning and work autonomously, outside of class, using ALEKS from McGraw-Hill Education to master precalculus topics. The individual learning paths that the software is able to provide supports students to master topics more quickly, thus freeing up class time for students to work collaboratively to develop a deeper understanding of these topics and how they relate to real-life scenarios through what van der Wal terms 'cases'. For example, students doing a Chemistry major will look at linear and quadratic functions and equations through the lens of Solutions. They will look at exponential and logarithmic functions in relation to Bacterial growth.

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▶ **Classes are intense, lasting for four hours.**

The first and last hour are with the lecturer, while for the middle two hours students work together on the case they have been set. This work will pull in Techno-mathematical literacy skills: students will learn to use Excel for calculations, how to evaluate data, identify error and so on. Classes are run on the basis of 'Inquiry based learning' with students encouraged to discover knowledge for themselves, supported by process-focused questions by the lecturer.

Instead of asking students 'what is the answer?' the lecturer asks:

'how did you approach this task?'

Care is taken to establish a warm and cooperative atmosphere to reduce maths anxiety.

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73%

92%

▶ *and the results...*

The results, after the first cycle, are **cautiously optimistic**. There has been a significant rise in the number of students passing the course first time (from 73% to 92%) and all of the lecturers involved report an increase in student motivation. As with any new initiative there are a few teething problems to iron out and tweaks have been made to the 'Hypothetical Learning Trajectory' for future courses. However, students are no longer asking '*why do we need to study this?*' **Instead they find the cases challenging and fun.**

It's a course that employs 21st century technology to deliver 21st century skills to 21st century students.

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To find out more, read the full study
**'Which Techno-mathematical Literacies
Are Essential for Future Engineers?'**
(Van der Wal et al 2017)
Open Access via SpringerLink.

Or to find out more about the ALEKS
software that has helped to facilitate this
new and innovative approach, visit:

mheducation.co.uk/aleks