

## Risk-Taking and Problem-Solving Week - developing risk taking, building resilience

### The challenge

UTC Reading has been trialling new approaches to developing students' problem-solving capabilities.

The project, run for the first time in 2016, has been driven by a greater focus on problem-solving techniques in the new GCSE mathematics syllabus.

This move has been led by the government as it seeks to raise levels of attainment and reduce the gap between GCSE and A-level mathematics.

The team at UTC Reading recognised that this shift demands a change in mind-set as much as skill-set – requiring students to embrace failure as a learning opportunity, demonstrate learning through trial and error and build resilience.

If students are to succeed within the new GCSE mathematics framework, they will need to approach questions with new lines of enquiry and show the journey they have taken to realising their answers.

### The response

The project was inspired and led by Director of Mathematics at UTC Reading, Cimen Sahin.

It was prompted by Cimen's own learning as part of a leadership programme run by UTC Reading's lead sponsor, Activate Learning. As the programme drew to a close, Cimen and a colleague from The Bicester School developed the concept of Problem-Solving Week.

The purpose of Risk-Taking and Problem-Solving Week was to give a clear focus on the importance of problem solving for students, staff and parents, and to remove the stigma associated with failure.

Cimen and her colleagues wanted students to realise the benefits of starting out on a line of enquiry and recognise the opportunities that lie in trial and error. This would not only benefit them as they approach the new GCSE mathematics syllabus, but elsewhere in school and in life.



## The project

Risk-Taking and Problem-Solving Week ran in the summer term, with its main focus on Year 10 students.

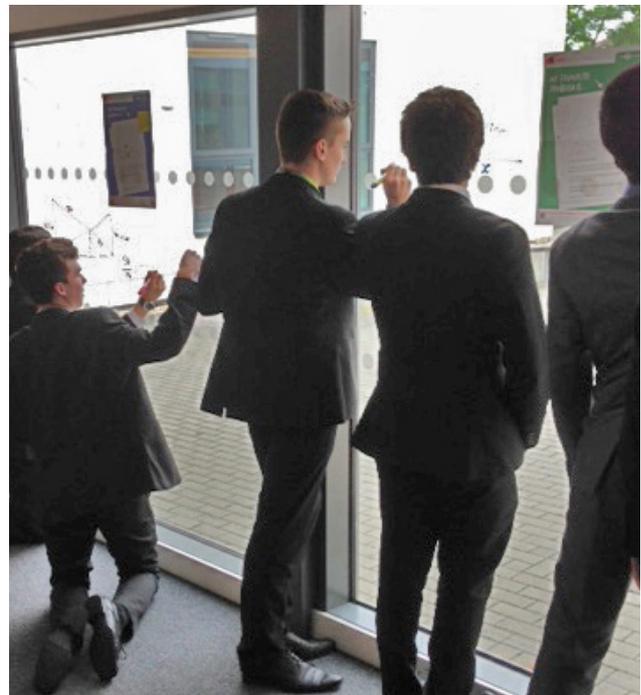
Students were split into 12 teams of five and tasked with working through a problem-solving pack of 50 questions across the week.

The teams organised the questions amongst themselves, developing skills of leadership, planning and delegation. They were required to show at least two attempts before recording their answer, with as much focus on the workings out as on the final response. To add a competitive element, a winning team was selected and rewarded based on their level of problem solving.

To raise visibility across the school community, questions were marked onto a glass problem-solving wall. As well as engaging visual learners, this also attracted interest from A-level students and teachers, keen to have a go. This had the added benefit of modelling risk-taking behaviour for younger students.

The week provided parents and carers with opportunities to get involved. Reports show that many young people's fear of maths stems from their parents, who lack the confidence to support their children in tackling maths problems at home.

During the week, questions posted on Facebook and Twitter attracted high levels of engagement from parents, who began debating answers and approaches amongst their online community. This forum also demonstrated that students were helping their parents to complete the problems, therefore building new skills and confidence.



## Real-world context

As an educational establishment closely aligned to industry, UTC Reading was keen to put problem-solving approaches into the broader employment context.

The final part of the week was a guest speaker session led by young entrepreneur, Graham Kitteridge.

Graham is co-founder and prototype engineer at Think Engineer – a research and development company specialising in prototype software and hardware.

Graham shared his story and gave examples of the essential role of problem solving in product development, showing pictures of failed attempts that led to a final product.

He said: "I think it's really important to encourage students to problem solve and sometimes take a punt towards a goal. Problem solving was not something I learnt a great deal about during my school years. I'm now an engineer and you could really just rename my

job as 'professional problem solver'. That being said, solving a problem can sometimes be the easy bit, identifying what the problem is in the first place can definitely take considerably more time.

Following his visit, Graham was approached by one UTC student keen to share his own prototype ideas and by others interested in working with the company on a future school project.


 I THINK IT'S GREAT THAT THE CURRICULUM IS CHANGING, SO THAT STUDENTS ARE GIVEN MORE COMPLEX QUESTIONS. THEY HAVE TO FIRST WORK OUT WHAT THEY ARE REQUIRED TO ANSWER AND THEN SOLVE THEM.
 

## The impact

The real impact of this project will be realised in the success rates of the GCSE mathematics students when they complete their exams next year. We also expect it to be seen in the smoother transition of students moving between GCSE and A-level mathematics the following year.

However, the focus of Risk-Taking and Problem-Solving Week has already led to a noticeable shift in the attitudes and behaviours of students. This is evident in the way that they are tackling the new GCSE syllabus and in the way that they are working with one another in other parts of the school.

Risk-Taking and Problem-Solving Week will now become a regular fixture in the academic year, as UTC Reading seeks to promote the value of this approach to learning.

## Test your problem-solving skills

### Questions

1

Eight unmarked envelopes contain the numbers: 1, 2, 4, 8, 16, 32, 64 and 128. Eve chooses a few envelopes randomly. Alie takes the rest. Both sum up their numbers. Eve's sum is 31 more than Alie's. How many envelopes did Eve take?

- a) 2    b) 3    c) 4    d) 5    e) 6

2

Twelve girls met in a café. On average, they ate 1.5 cupcakes each, although no cupcakes were actually divided. None of them ate more than two cupcakes and two of them ate no cupcakes at all. How many girls ate two cupcakes?

- a) 2    b) 5    c) 6    d) 7    e) 8

3

There are 20 students in a class. Some of them sit in pairs so that exactly one third of the boys sit with a girl, and exactly one half of the girls sit with a boy. How many boys are there in the class?

- a) 9    b) 12    c) 15    d) 16    e) 18