



# Levelling Up: Case Studies

*The London Mathematical Society (LMS) commissioned the Observatory for Mathematical Education to write this case study to highlight the impact and benefit of the Levelling Up: Maths scheme to participants with different roles.*



**University of  
Southampton**

## University of Southampton, 2024

Southampton have been running *Levelling Up: Maths* for three years. The initial drive to take part in the programme came from the Head of School for Mathematical Sciences, while the day-to-day running is done by the three academics that make up the Mathematical Sciences outreach team. The School is supportive and provides funding for the programme out of the outreach budget. Compared to other outreach activities, *Levelling Up: Maths* is more personal, since participants get to work with tutors on a small group basis. It also helps Southampton to span the full secondary age range with their outreach, since their other outreach events focus on younger students in years 7 to 10.

The Southampton team has found the regular gatherings and workshops really helpful to discuss practicalities with academics from other universities, especially in the early stages of setting up the programme. Since becoming more established, they have also taken part in panel discussions at the gatherings. Common questions from new universities are about how to recruit participants and how to get funding, so it's useful to have a forum to be able to find out how others have gone about it, even though it's different for each university.

*Levelling Up: Maths* is advertised within local schools as designed for students that are aiming to study maths or a highly mathematical subject at university, although some participants are still making up their minds. A level students are often told that university maths is different from maths at school, but not told how it's different, so an important goal for the Southampton programme is to give students an opportunity to experience the difference for themselves. For example, the tutorials are focused on critical thinking, whereas A level Mathematics is more procedural. In addition, common feedback from participants is that they value the chance to hear from current undergraduate students who are only a few years ahead in their educational journeys.

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*"The fact that they got a taste [of university maths] and after a couple of months they realised this is not their cup of tea, I think is a good idea. They can, at an earlier stage, realise this and then spend more time to figure out what they actually want to do in university."*

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Some participants do decide to go on to study maths at university, while others may drop out of the *Levelling Up: Maths* programme after deciding that further maths study is not for them. Both are seen as positive outcomes, since taking part in the programme has helped the students make informed decisions about their future.

A further hope is that the small group tutorials will help students feel less intimidated by both older university students and lecturers, so that when participants go on to university themselves, they will feel confident to seek help and ask questions.

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*"I think when they actually eventually get into a university, it will be a huge benefit because now they'll be less afraid to ask questions ... which is extremely important especially for first generation university students."*

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Through tutoring on *Levelling Up: Maths*, tutors at Southampton have also developed skills in explaining and communicating mathematics. There is a noticeable difference from when students are first interviewed to their skills after a year of tutoring, when the experienced tutors help to train new recruits. For example, before becoming tutors, students' writing on the board was often unclear, whereas after gaining tutoring experience their writing of mathematics is much more organised. Tutoring on the programme therefore benefits their own mathematics by helping them consider and refine their arguments as well as how to communicate and write maths clearly. Tutors report that the *Levelling Up: Maths* materials are really good and they enjoy using them.

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*"I'm very impressed. I can see a huge difference from when they [the tutors] first did their interview, to how they're now demonstrating what they're doing to the new ones"*

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Luke, University of Southampton

In his second year at university, Luke had been thinking about private tutoring as a way to earn money in his spare time but wasn't sure how to go about it. So when an academic gave a presentation in one of his lectures about *Levelling Up: Maths* and invited applications to become tutors, he was immediately interested.

The training was helpful for easing into becoming a tutor. Even in the interview for the role, he was asked to give a demonstration of teaching a topic and was given immediate feedback on how to improve. Once appointed, he was able to practise presenting mathematical concepts in mock tutorials on Zoom, where other tutors took the role of students and gave peer feedback. He was nervous about teaching his first few sessions and it was a bit awkward at first. But once they started talking about the maths and solving problems together, he found the students were enjoying themselves, which made him excited to come back and run the next session. Luke found the structure of



the session materials really helpful in providing guidance and different ways of thinking about a topic, while also allowing him freedom to bring his own ideas and ways of understanding the maths.

In Luke's experience, students participating in the programme were enthusiastic and enjoyed going into depth about the maths topics. They frequently asked about the maths Luke was learning at university and he was able to link his university experience with the A level content. Having access to graphics tablets meant that the students could write alongside the tutor, so solving problems was a collaborative process. However, Luke also encouraged the students to practice "speaking maths" and helped them to become more accurate with their use of mathematical language verbally as well as on paper.

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*"You're working with A level students who are really interested in maths and they love to have those conversations with you about more complex maths and maths you do at university and just [go] more in depth about the topics. It's really really great fun in that respect."*

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Tutoring on the programme increased Luke's confidence with speaking in front of groups. When recently applying for jobs, he found that interviews felt very similar to this, so that he was able to apply the skills he'd learned as a tutor. When starting his maths degree, Luke had a vague idea that he would probably end up doing "something in an office with numbers" and had no plans to become a teacher. Through working on the *Levelling Up: Maths* programme his ideas gradually shifted, so that, having finished his MMath, he is now about to start training as a maths teacher.

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*"Seeing those students have that light bulb moment where they click something that they haven't seen before or didn't quite understand ... it's made me absolutely fall in love with teaching maths."*

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