

Educating Mathematically Exceptional Children



DR COLIN FOSTER

At Preneur World, we recognise the unique challenges faced by parents of children who display exceptional talent in mathematics. Nurturing these gifted minds requires more than traditional teaching; it demands a nuanced approach that balances cognitive development with emotional wellbeing. To explore how best to support mathematically able children, we turned to esteemed educational expert Dr Colin Foster, Reader in Mathematics Education at Loughborough University. In this exclusive interview, Dr Foster offers ten insightful answers to the most pressing questions about acceleration, enrichment, homeschooling, and the social development of mathematically exceptional young learners.

1. Should exceptionally able children in maths be accelerated to a higher year group, or is it better to keep them with their peers and offer enrichment within their current year?

Both strategies can be effective and both can be problematic. To some extent this depends on how 'exceptional' the child seems to be. Understandably, parents will often put forward a particularly positive, perhaps inflated, view of their child's abilities. They may be projecting onto them features of their past selves, their other children or simply their dreams. It is very important to try to be as objective as possible in assessing your child's exceptionality and to listen to what others are telling you. If everyone around you is saying 'above average but not exceptional', then try to resist the temptation to assume that they are all wrong!

A skilful teacher should be able to provide sufficient challenge and stimulation for almost all of the children within that particular age cohort. Frequently this can be done within the confines of the same curriculum, by offering stretching problems for the child to solve. However, this may be impractical for the extremely exceptional child, who may struggle to thrive without some acceleration. In these cases

the potential benefits of this do need to be seen in the context of challenges around socialisation, which may often be complicated by the neurodiverse profile that many mathematically exceptional children bring.

2. Some schools argue that mathematically advanced children should remain in their current year group and receive 'deepening' or 'enhancement' rather than acceleration. From a cognitive development perspective, does this approach effectively meet their needs?

There are pros and cons and it really depends on what you want for your child. There are multiple 'best' options. For the vast majority of above average children, high-quality in-class enrichment will probably be best. The UK Maths Trust (<https://ukmt.org.uk/>) and the Mathematical Association (<https://www.m-a.org.uk/First-Maths-Challenge>, <https://www.m-a.org.uk/primary-maths-challenge>) run 'mathematical challenges', full of challenging mathematical problems that can be accessed by children without needing to teach them additional content. The problems draw on the mathematics within the curriculum for those ages, but to solve the problems requires using that knowledge creatively. Mathematical puzzles, such as the books by Martin Gardner and the problems on NRICH (<https://nrich.maths.org/>), can challenge mathematically advanced children to deepen and broaden their mathematics without acceleration.

3. How can parents respond when schools say that acceleration isn't beneficial because children should be 'well-rounded' rather than focused on excelling in one subject? Does research support the idea that acceleration harms holistic development?

There is an age-old debate in education over specialisation versus generalisation, which is ideological rather than something we can decide on empirically. Traditionally, children are allowed to specialise increasingly through the teenage years,

but until then are expected to be 'rounded'. This works better for some children than for others, but really there is no 'right' answer. If development in mathematics appears to be coming at the cost of development in other important areas (e.g. reading), then for me that would be a concern. If a child refuses to do anything besides mathematics, that needs addressing. But in many cases the exceptional child is doing better than average across the board, and in that case 'spiking' in mathematics would seem to be unequivocally positive.

4. Many parents report feeling dismissed or 'gaslighted' when they raise concerns about their child's academic stagnation. How can they present their case effectively, using research-based arguments, to ensure their child receives appropriate educational opportunities?

I think the first stage is always to listen to and understand the school's argument. Even if you are certain that the school is mistaken about your child's needs, try to find common ground in supporting your child's learning. Recognise that the school has to balance the needs of hundreds of children, and may be much more concerned about underachievers than overachievers. If the provision that you are demanding is highly resource intensive, then you are unlikely to be successful. Try to engineer a compromise that is workable from the school's point of view while addressing your vision for your child's mathematical development.

5. What impact does a lack of academic challenge have on exceptionally able children, particularly in maths? Do they risk disengagement or underachievement if their needs aren't met?

I have seen exceptional children become withdrawn and frustrated because their needs are not being met, and that is desperately sad. If your brain thrives on high levels of challenge, and you are fed a constant diet of trivial, straightforward tasks, you are likely to

rebel against this by turning your talents and energies elsewhere, such as towards seeking to disrupt school lessons. This is obviously in no one's interests.

6. For parents considering homeschooling their mathematically exceptional child, what are the key do's and don'ts they should be aware of? How can they ensure their child receives a rigorous yet well-rounded mathematical education while also fostering problem-solving and independent thinking skills?

Homeschooling is obviously a huge step and commitment for any family. Parents will need to think through how they will provide this, and for what time period (with what exit strategy), and consider their own needs and those of any other children in the family, as well the financial implications. When parents homeschool reluctantly, because things have fallen apart at school, this can put a lot of pressure on families. But when everyone is positive about doing it, homeschooled children can really thrive, and receive an education that's at least as broad as any school child – if not much broader. I know homeschooled children who have wonderfully broad experiences of the world and rich connections with other families, both homeschooling and not.

ABOUT THE EXPERT

Dr Colin Foster MA(Cantab) PhD PGCE CMaTeach SFHEA is one of the UK's leading figures in mathematics education. A Reader in Mathematics Education at Loughborough University, he is Editor-in-Chief of the International Journal of Mathematical Education in Science and Technology and former President of the Mathematical Association (2022–23). With over a decade of secondary school teaching and extensive academic research experience, Dr Foster is celebrated for his pioneering work in designing mathematical tasks and championing innovative pedagogy. He is a Chartered Mathematics Teacher and Senior Fellow of the Higher Education Academy. Find out more at lboro.ac.uk/research/cmc