

Dr Sue Gifford, Chair, on behalf of the Early Childhood Maths Group

The [Early Childhood Maths Group](#) (ECMG) comprises practitioners, teacher educators and researchers who are expert in the mathematics learning of children from birth to seven. The group promotes early mathematics education, with the aim that all children develop confidence, competence and enjoyment in mathematics. We produce guidance, identify resources and research, and respond to requests for advice about early childhood mathematics curriculum, assessment and pedagogy. The group includes individuals employed by England's Department for Education (DfE) as Subject Matter Experts in early mathematics.

Attitudes to numeracy

1.1 The current negative attitudes to numeracy, particularly among young women, affect not only their achievement in mathematics, but those of the next generation, as parents and early years educators. They are likely to pass on negative attitudesⁱ, particularly to girlsⁱⁱ. A proportion of practitioners working with the youngest children have failed GCSE mathematics, requiring curriculum, assessment and professional development to reverse negative associations with mathematics. Parents of children in the lowest socio-economic circumstances are particularly likely to have failed mathematics at GCSE level meaning that the crucial familial influences for the most vulnerable children are likely not to be positive for mathematics. It is crucial that this cycle is broken and that children experiencing socio-economic disadvantage and girls' positive attitude development is prioritised, especially in secondary education when they tend to declineⁱⁱⁱ.

2.1 School experiences of mathematics need to be more positive, with a more engaging, problem-solving and reasoning based curriculum. In secondary education in particular, improved teaching and reduced focus on examination is needed to avoid narrow memorisation-based 'teaching to the test'. Teaching needs to focus more on spatial and proportional reasoning and problem-solving, and involve more dialogic practices. To enable this to happen the GCSE needs to be overhauled as it is not currently fit for purpose but drives teaching and policy in the system reducing the potential impact of policy initiatives intended to change negative mindsets.

Numeracy skills

7.1 Government have a key role in supporting the development of numeracy skills in the early years pre-school. Preschool mathematics is the strongest predictor of later school achievement^{iv} and improvements in mathematics attainment have the potential to reduce inequality in earnings^v. Income-related differences in children's counting have been identified by age four with the ages of three to five considered an ideal time to rectify income-related learning gaps in children's understanding of numbers^{vi}.

7.2 A strong foundation in numeracy in school and pre-school needs curriculum and assessment based on research evidence about the mathematics which most strongly predicts future success. Research shows that there are key concepts children need at the start of school, and also that numeracy is improved by teaching children to think spatially, to recognise patterns and to solve problems. Key predictors found in research are number sense, pattern and spatial reasoning. Research suggests that young children with less developed numerical skills go on to make slower progress in their later education^{vii}, and that young children's patterning abilities^{viii} and spatial skills^{ix} predict their later mathematics achievement. The government is currently funding professional development for practitioners working with children from birth to four years, which reflects this broader, research-based view of mathematics (written by ECMG members). This approach has been shown to be particularly effective with disadvantaged groups. However, the effectiveness of professional development is limited by current curriculum and assessment arrangements in the first year of school.

7.3 The DfE's current curriculum guidance and assessments are not based on research evidence about the predictors of maths success. This directs pre-school practitioners and Reception teachers to focus on the wrong things in mathematics. It risks children 'slipping through the net' and progressing further through schooling without a secure grasp of the foundational concepts which are likely to determine adult numeracy levels. The statutory assessments for the first year of school need urgent revision to focus on the mathematics that matters most to long term numeracy outcomes. The statutory Reception Baseline Assessment at entry to school should be withdrawn and replaced by non-statutory formative assessment tasks that provide Reception teachers with knowledge of children's understanding of indicative areas of number sense, patterning and spatial reasoning. The Early Learning Goals for 4-5-year-olds need revising to ensure that teachers prioritise what matters most to future mathematical success and that any children not achieving these are flagged as they move into National Curriculum study (Year 1, 5-6 years, onwards). Entering National Curriculum Key Stages 1-4 with secure understanding of key foundational concepts, alongside positive maths attitudes, is the key to unlocking effectiveness of school mathematics teaching. This broader view of maths, which values spatial play, pattern-spotting and problem-solving is also likely to improve the attitudes of educators as well as children.

7.4 There is, quite rightly, a current focus from government on informing parents about the importance of young children's wellbeing, social skills, language and literacy, but there are few initiatives about mathematics with families (see the government's Best Start in Life [early learning and development](#) which does not mention mathematics). The government could provide funding and expertise for Family Hubs to create mathematics initiatives and ensure that mathematics is included in all policy moves to better prepare children for school. The ECMG propose a national campaign, 'Creating a Nation of Maths Lovers', about enjoying mathematics in family and social spaces. This would include promoting games, puzzles and number rhymes in family routines in the same way as reading and sharing books is an

everyday norm. Aiming this at families with young children emphasises a playful attitude to mathematics learning, aiming to break negative cycles of poor mathematics attitudes for adults and children. Examples include community initiatives like [City of Maths](#)' plans for a mathematical playground in Leeds and maths activities in Asda Supermarkets, and internationally, [Playful Learning Landscapes](#). This could be a government-backed national publicity campaign involving local communities and industry to turn the tide in the nation's relationship with mathematics.

Numeracy Education

8.1 Early years and primary education are broadly effective in providing mathematics teaching which enables most children to succeed on national tests at 10-11 years (end of Key Stage 2). However, there is a persistent attainment gap between socio-economically disadvantaged children and their peers (4.7 months by Reception and maintaining throughout the education system^x). Pre-school is the ideal time to proactively address differences in school mathematics outcomes before they occur.

8.2 The key barrier to gaining a strong foundation in numeracy at school is low mathematics attainment on entry to school. This means that pre-school numeracy education is a national priority: those at greatest risk of low attainment, children experiencing socio-economic disadvantage, need an early years mathematics curriculum focussed on number sense, patterning and spatial reasoning. This needs to be provided by maths confident and knowledgeable pre-school practitioners through guided play^{xi}.

Government priorities

10.1 The Government has taken steps over the last few years to support pre-school practitioners to develop their mathematics practice through the online Child Development Training module, Professional Development Programme and national rollout of Maths Champions. This is In addition to building the necessary expertise and support infrastructure in Early Years Stronger Practice Hubs and Maths Hubs. However, further sustained investment is needed if this is to achieve a step change in early mathematics teaching. Real change will require a substantial scaling up of capacity for professional development, in order to reach a sufficient proportion of the large number of pre-school education providers and schools. This is particularly true given the high turnover rates and increased demand for staff in the pre-school sector^{xii}, alongside recruitment and retention issues for many schools and pre-school settings.

10.2 To improve numeracy, the Government should:

- revise the Early learning Goals for mathematics to include patterning and spatial reasoning, removing 'automatic recall' of number facts
- withdraw the Reception Baseline Assessment and replace it with non-statutory formative assessment tasks that provide Reception teachers with information about aspects to focus on with individual children
- over-haul the mathematics GCSE which is not fit for purpose
- support a campaign for families and communities to create a nation of maths lovers by bringing mathematics into family routines and spaces.

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- ⁱ Centre for Early Maths Learning (2025). *Evidence Briefing 1: Is there a phonics for maths?* <https://ceml.ac.uk/outputs/evidence-briefings/>
- ⁱⁱ Beilock, S.L., Gunderson, E.A., Ramirez, G., & Levine, S.C. (2010). Female teachers' math anxiety affects girls' math achievement. *Proceedings of the National Academy of Sciences*, 107(5), 1860-1863.
- ⁱⁱⁱ Golding (2022). *UK Mathematics 14-19: the gender jigsaw*. <https://www.jmc.org.uk/wordpress-cms/wp-content/uploads/2022/03/UK-mathematics-14-19-gender-jigsaw-Report-Jan-22-final.pdf>. Joint Mathematics Council.
- ^{iv} Duncan GJ, Dowsett CJ, Claessens A, Magnuson K, Huston AC, Klebanov P, Pagani LS, Feinstein L, Engel M, Brooks-Gunn J, Sexton H, Duckworth K, Japel C. (2007). School readiness and later achievement. *Developmental Psychology*, 43(6), 1428-1446.
- ^v DfE (2025). *Key Stage 2 attainment and lifetime earnings*. https://assets.publishing.service.gov.uk/media/6867d497fe1a249e937cbcdb/Key_Stage_2_atainment_and_lifetime_earnings_research_report_-_July_25.pdf
- ^{vi} Asmussen et al. (2018). *Key competencies in early cognitive development: Things, people, numbers and words*. Early Intervention Foundation. <https://www.eif.org.uk/report/key-competencies-in-early-cognitive-development-things-people-numbers-and-words>
- ^{vii} Cahoon, A., Gilmore, C. & Simms, V. (2021). Developmental pathways of early numerical skills during the preschool to school transition, *Learning and Instruction*, 75, 101484.
- ^{viii} Rittle-Johnson, B., Zippert, E.L., & Boice, C.L. (2019). The roles of patterning and spatial skills in early mathematics development, *Early Childhood Research Quarterly*, 46, 166-178,
- ^{ix} Gilligan, K.A., Flouri, E., & Farran, E.K. (2017). The contribution of spatial ability to mathematics achievement in middle childhood, *Journal of Experimental Child Psychology*, 163, 107-125.
- ^x DfE (2025). *Early years foundation stage profile results: Academic year 2024/25*. <https://explore-education-statistics.service.gov.uk/find-statistics/early-years-foundation-stage-profile-results/2024-25>; EPI (2025). *Annual report 2025: Disadvantage*. <https://epi.org.uk/annual-report-2025-disadvantage/>; Coates, A. (2025). Tracking mathematics achievement gaps in England: Gender, socioeconomic status and ethnicity. *British Educational Research Journal*, 51(3), 1149–1177.
- ^{xi} Skene, K., O'Farrelly, C.M., Byrne, E.M., Kirby, N., Stevens, E.C., Ramchandani, P.G. (2022). Can guidance during play enhance children's learning and development in educational contexts? A systematic review and meta-analysis, *Child Development*, 93(4), 1162–1180.
- ^{xii} An estimated 6-8% increase in workforce is needed to meet the additional demand created by the recent expansion of the early years entitlement at a time when the workforce is reducing (-3% since 2019). <https://earlymaths.org/ecmg-and-ndna-policy-briefing/>