EARLY CHILDHOOD MATHS GROUP

18th July 2021

Dear Ofsted

In the interest of improving mathematics education for all young children, the Early Childhood Maths Group have some comments on the Ofsted review of mathematics research (referred to as 'the review' throughout this letter) and propose some amendments. We endorse its purpose, *to identify factors that can contribute to high-quality school maths curriculums, assessment, pedagogy and systems* and would like to offer our expertise in refining the message about high quality mathematics education for Reception and Key Stage 1 (KS1). We understand that the review is not comprehensive and is filtered by the adherence to the *Principles behind Ofsted's research reviews and subject reports.* We hope you will appreciate this response as part of the *input from the broader subject community* that you are seeking, as explained in your principles document.

We are committed to improving the mathematics attainment of young children at the start of school, since this has such predictive significance, as noted in the review. We agree with the inspection framework's focus on schools helping *pupils to gain enjoyment through a growing self-confidence in their ability,* especially in order to minimise later gaps in attainment. We therefore agree with the recommendation for younger learners of *proactive approaches that can be as simple as ensuring that they are given dedicated time to learn and rehearse mathematics every day (p8).* We also agree that a focus on depth of understanding rather than acceleration is important with younger children, for instance regarding early number concepts. However, this should not be at the expense of a broad mathematics curriculum, since research is increasingly showing the importance of aspects such as patterning and geometry (Rittle-Johnson et al., 2019; Verdine et al., 2014).

We endorse the emphasis on planning to build on previous learning in a systematic way, and not leaving progression to *choice or chance.* This is crucial for all learners but particularly for children who have less experience of the mathematical foundations of number, pattern and geometry. Underpinning early mathematics practice with knowledge of developmental progressions, which enable teachers to build upon prior learning successfully, is a consistent finding from research (e.g. EEF, 2020; Frye et al., 2013). It would be helpful to emphasise the importance of research-informed developmental progressions in the review. The ECMG have produced a research-based progression document for spatial reasoning, since this is

a new and important addition to the EYFS Educational Programme for mathematics (DfE 2021). You might like to use this as an example, since it also includes age–appropriate suggestions for practice in KS1, which may be useful for inspectors as well as teachers. We therefore strongly agree on the need for professional development in early mathematics, including support for teachers' understanding of typical developmental progressions.

We note that the review draws on the EIF Overview of research, which identifies the need for a distinct ***early years pedagogy*** with ***a greater stress on knowledge of learners*** (p12)*. This is indeed important (and research evidenced) but not entirely apparent in the review. Greater knowledge of individual learners is needed since children's pre-school experiences vary widely: as mentioned above, familiarity with developmental progressions would help teachers to assess and plan appropriately. We feel that the review should give greater attention to recent research relating to the earlier school years. For instance, the predictive significance of patterning is not mentioned (although Rittle-Johnson et al., 2017, is cited, where this is the main finding). Where the teaching of 'younger' pupils is discussed, the age-phase referred to is not always clear (EYFS reception, KS1 or all of primary). Age-appropriate research should be used to support conclusions made. For instance, with reference to problem solving and *giving younger pupils the ability to understand word problems,* all research cited is with KS2 age children. Instead, the review might acknowledge research with four to seven years olds, such as Casey et al. (2008) and Davis & Pepper (1992). This would also present a more balanced picture of problem solving to include practical and non-routine problems and promote a high quality approach to teaching problem solving.

While some research about early years pedagogy is cited in the review, the main findings of studies are not clearly represented. For instance, Cross et al. (2009) recommend:

> *Children need adult support and instruction to build and extend their early knowledge and learn to focus on and elaborate the mathematical aspects of everyday situations – to mathematize**.***

Unfortunately, this research is cited (footnote 120) in support of the statement:

> *'Novice learners' of new mathematics content need systematic instructional approaches similar to those used to teach early reading and writing. Teachers need to ensure daily dedicated time for teaching and practising component parts.*

This misrepresents the report's key messages about the importance of adult interactions focused on informal experiences. Clements and Sarama have objected to the review's interpretation of their study as recommending *extra elements of explicit, systematic instruction* (footnote 122) for 'novice learners', which they are concerned will be interpreted as recommending a 'direct instruction' approach instead of systematic assessment and planning with age-appropriate pedagogy.

There is robust research on the benefit of games in mathematics in the early years (e.g. Siegler & Ramani, 2009), which is not reflected in the review's statement:

> *..teachers should be wary of the temptation to invert this causal pathway by, for example, substituting fun games into lessons as a way of fostering enjoyment and motivation. This is because using games as a learning activity can lead to less learning rather than more.* [footnote 44]

The cited paper (Bragg, 2012) is misrepresented, according to the author, as it takes one specific example of one game-playing situation with nine to 11 year-olds (in comparison with varied pedagogy) and generalises this to all games with pupils of all ages. The cited paper concludes, "*the case for the use of games in classrooms remains inconclusive"* and recommends that games are used in mathematics teaching as *"one component of varied learning activities"* (Bragg 2012: 1464).
We suggest amending or removing this negative message about games.

We are also concerned by the review's warning:

> *.. teachers need to be cautious when considering curriculum approaches that are heavily weighted towards encouraging informal and self-generated methods. These approaches may purport to develop pupils' understanding, but the evidence shows that when pupils use a variety of informal procedures, it can inhibit understanding later on.* [footnote 83].

This not supported by the research with KS2 aged pupils in the cited paper (Gravemeier et al., 2016)which instead argues for the need for teachers and textbooks to bridge between informal and formal methods. This is an important point and it is unfortunate that this is not identified in referencing the article, since schools may interpret this as advice to ignore pupils' informal approaches, rather than bridging from these to build understanding of formal methods.

Another example of misrepresentation of research in the review which affects the messages for teachers of children four to seven years, is the statement that young children need to have automatic recall of 100 addition facts:

> *Many young pupils need and benefit from systematic provision of sequenced core content that becomes the building blocks of later success.* [footnote 58]
> *For example, 'more than 100 basic addition facts must become automatic before children can play around with and contemplate [different] types of problems'.* [footnote 59]

The article cited (Chard et al., 2008) does not provide evidence for this, instead recommending that 5 to 6 year olds should be taught '+1' facts. A more relevant study of 250 KS2 aged children found that *"ignorance of basic number combinations is not the barrier to achievement in mathematics"* (Cowan et al., 2011: 800). We suggest that this unsubstantiated statement should be removed, as it is misleading.

To summarise, we believe that the kinds of misrepresentation of research in the review that we have highlighted undermine the key messages for teachers from research into early mathematics. We are concerned that practice will be distorted if the recommendations from the review are followed by teachers of four to seven year olds. We suggest that a second edition might include more relevant and accurately reported research, to retain the integrity of Ofsted.

The ECMG are committed to supporting high quality mathematics education for children birth to seven years and offer our expertise to government and other organisations to ensure that messages to schools and settings on early mathematics education are informed by the best available evidence. We value our current working relationship and dialogue with Ofsted and feel that we can continue to work together (formally and informally) to benefit schools, teachers and ultimately children. We can offer a sounding board and source of evidence on early mathematics to support your extensive research team and inspectorate who have a much wider educational remit. Please do get in touch if you would like our support with the current or future reviews.

Yours sincerely,

Sue Gifford

Chair and on behalf of the Early Childhood Mathematics Group

*P12: EIF Overview of research

Early years

…The types of knowledge early years teachers need are therefore similar too (sic), but also distinct from those of teachers in the later years of primary and beyond. Like other teachers, they require subject knowledge and pedagogical knowledge (though the latter of course here refers to early years pedagogy), but there is a greater stress on knowledge of learners, learning and child development, due to the rapid development of children at this age, and on communication.

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