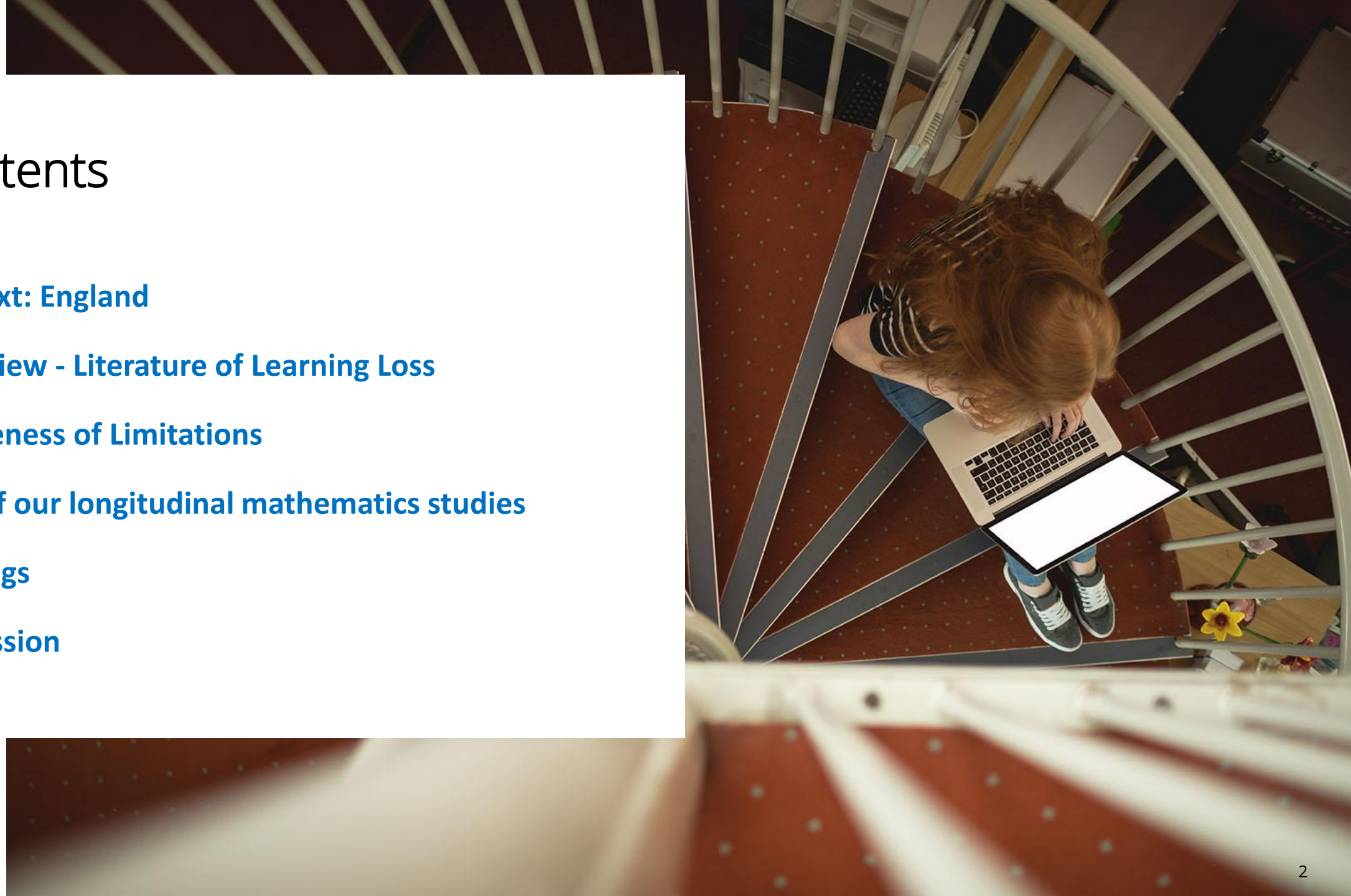
Managing the impact of a pandemic in education - special focus on assessment

Grace Grima (Pearson)
grace.grima@pearson.com
& Jennie Golding (UCL)
j.golding@ucl.ac.uk

Pearson

Contents



Context: England

- Most students in England experienced two periods of pandemic-related home learning (Mar – Sep 2020 / Jan-March 2021). Once back, students commonly experienced significant continuing constraints on learning
(Redmond, Golding & Grima, 2021; Golding & Grima, 2021).
- National assessments at age 11 were cancelled in 2020 and 2021, and examinations at age 16 (‘GCSEs’) and 18 (including ‘A Levels’) were replaced in 2020 by ‘centre-assessed grades’ and in 2021 by ‘teacher assessed grades’.

Overview - Literature of Learning Loss

- Studies of pandemic-associated ‘learning loss’ in England are currently ongoing, and often include mathematics in their areas of focus.
- Large-scale measures of pandemic-related learning loss offer comparatively rapid, and representative, information to inform policy.
- In England, recent data suggest all age groups from 5 to 16 have experienced significant learning loss sometimes amounting to the equivalent of several months’ usual learning in key areas of literacy and mathematics.
- However, our smaller-scale, qualitative studies suggest the policy-driven focus on easily measurable estimates may be missing important aspects of learning loss, including subject-specific loss, that are harder to quantify and often less tractable to address.

Awareness of Limitations

Focus on easily measurable estimates of ‘learning loss’ may be missing important aspects of learning that are harder to quantify and often less tractable to address, such as genuine or sustained problem solving, unstructured mathematical communication, and/or multi-step reasoning.

They offer no opportunity for oral, extended or open responses, or for probing of conceptual grasp or partial understanding.

They do not assess students’ affective characteristics: their self-efficacy or confidence or resilience in learning.

Such assessments do not access the impact on learning of changes to high-stakes examinations (ages 16-18) / nationals assessments (primary). Further, and importantly, they are working at scale, so do not identify any small-scale occurring marginal learning gains during the pandemic.

Finally, in England, existing school-level studies have not attempted subject-specific assessment of pandemic learning loss for school students beyond the age of 16.

Foci of our longitudinal mathematics studies

Studies were designed for in-depth understanding of use of curriculum and assessment resources, enactment and learning, rather than quantitative messages about cohorts.

- The primary study focuses on classrooms using ‘Power Maths’ materials, promoted by the English Department for Education as supporting their drive for ‘mastery’ of the primary mathematics curriculum; (2018-2022, pupils aged 5-11)
- the secondary study focuses on classes working towards Pearson mathematics A Level qualifications. Upper secondary (2017-2021, students aged 16-18)

Both studies analyse teacher and student enactment, and perceptions of impact of new curricula and related resources, where possible contextualised and related to classroom observations.

These studies contribute in-depth subject-specific understanding of pandemic-related learning loss. Importantly they draw on student and teacher voice.

Pearson

Findings

- Patterns of Engagement
- Mathematics learning losses
- Genuine and sustained problem solving
- Mathematical reasoning
- Affective impacts
- Mathematical communication
- Oral, extended or open responses and probing of conceptual grasp
- Small-occurrence variation in learning loss
- Impact of changes to high stakes assessments
- Gains from the pandemic

Overall Findings

Across our longitudinal mathematics studies in England, we found aspects of the curriculum such as routine facts and procedures were reported relatively easy to teach remotely (though still not easy to learn remotely).

What have been marginalised in both remote and back-to-school-constrained learning are deep and connected conceptual learning and those mathematical processes and dispositions valued highly in recent curricular reforms: mathematical problem solving, reasoning and communication, and mathematical confidence, resilience, and self-efficacy.

These are harder to teach (and learn) and arguably, hardest to assess, either formatively or summatively, especially with reduced opportunity to oral, extended or open dialogue, or opportunities to probe conceptual grasp or mathematical thinking.

Findings: Mathematics learning losses (primary)

Primary teachers reported that the youngest children were most vulnerable to important gaps, because at pandemic onset, they were still establishing key ideas:

> *There are massive gaps of fundamentals, with the youngest children losing even basic ideas. They've lost their basic number (y3 teacher 4, June 2020);*

Curriculum areas that are known conceptual challenges, such as fractions, were reported more difficult still to teach or learn successfully at a distance, and schools often marginalised work on shape and space, time and money in an effort to 'cover' number work.

Through to July 2021 primary teachers widely reported gaps in progression towards deeper 'mastery' mathematics learning.

Findings: Mathematics learning losses (A levels)

At A Level also, teachers found difficulty in engaging students in deep learning or monitoring learning, and students reported challenges in concentration and motivation, as well as often only superficial learning achieved:

> *Most students found it very hard to work independently and we couldn't monitor what they were doing or how. Consequently their mathematical knowledge and skills have declined (A Level teacher 12 November 2020);*

> *We have only a base level understanding of the content rather than a full in-depth understanding (y13 student November 2020).*

> *Mechanics is essentially practical, and there's a particular way of thinking about it that it's hard to "catch" from a book (y13 student 123, March 2021);*

A small number of A Level teachers also indicated that students reported mathematics being harder to learn remotely than their other subjects, in part because of its fundamentally abstract nature:

> *Every year group affected has said that maths is the hardest A Level to really engage with remotely, or without being able to work closely with teachers or other students: you have to understand the ideas in depth, toss them around and challenge them, superficial activity doesn't do it (y12 teacher 20, July 2021).*

Findings: Genuine and sustained problem solving

Curricula have a renewed focus on problem solving, as well as on mathematical reasoning for younger students, and at A Level, proof in particular. These areas are difficult to teach, and also difficult to assess. Little evidence of them in the large-scale studies of primary level pandemic learning loss.

Both areas draw on deep conceptual grasp, and were still proving intractable by summer 2021 :

> *Children are making really good progress catching up with the basis, but mastery, being able to play with those ideas and really solve new problems with them, we're nowhere near there yet, for most children (Primary maths coordinator 5, July 2021);*

> *(We)haven't got enough depth of knowledge to tackle problem solving questions (y13 student 80, March 2021)*

> *It's still the problem solving, and the proof, for most: we're getting through the basics, but digging deeper with those before students have grasped essentials, is just not happening: the accumulation of constraints is casting a long shadow (A Level teacher 15, July 2021).*

Findings: Mathematical reasoning

Skills with communication underpin the development of mathematical reasoning.

A Level teachers identified this area as an ongoing challenge in pandemic-constrained learning, and the earlier roots in primary were similarly affected:

> *When online there is only ever surface level coverage, we don't do hard bits like proof parts of a question (y13 Student 9, November 2020);*

> *Developing reasoning has been found to be tricky as the explanations needed can be quite lengthy and we have found that parents too struggle with this (Y6 teacher 2, November 2020);*

Some students and teacher pointed to the long-term costs to such losses:

> *My knowledge will be of less detail: although I may have the fundamentals I won't have the proofs or extensions which are vital for university (Y13 student 48, Spring 2021).*

Findings: Affective (self-efficacy, confidence, resilience, mental wellbeing)

We uncovered subject-specific affective damage, known to underpin subject-specific success and inclination for continued engagement with mathematics:

Children are still enjoying Maths but their confidence has been knocked because they are finding concepts harder than they may do usually, which has meant the resilience has also suffered slightly. (Maths coordinator 11, November 2020);

Confidence took a hit due to uncertainty and lack of real challenge (y13 student 48, March 2021);

There was more widely report of mental wellbeing impact directly exacerbating learning loss:

Not much progress, mental stability isn't well (y13 student 67, November 2020);

It was easy to feel isolated in lockdown, so talking to peers became difficult and that has knock-on effects on the maths, makes you lose faith in what you can do (y13 student 35, March 2021).

Findings: Impact on learning of changes to high stakes assessments

Many of our primary schools instead produced individual profiles of student mathematics exposure and success by content topic. Several teachers suggested the cancellation released time for the extension of higher-quality learning:

> *As we don't have the SATS anymore we could ...push all year, in a nice way, and we … just say we're going to get you ready for Year 7. (Year 6 teacher 8, Spring 2021).*

The cancellation of A Level examinations negatively affected quality and/or quantity of mathematics learning:

> *Initially focused only on practice papers however stopped setting work following announcement of cancelled exams' (y13 teacher 3, July 2020);*

> *We had finished the course by lockdown starting so they have covered all content but had not fully consolidated it yet. This will mean they find their first year courses at university a little harder than in a normal year (y13 teacher 1, July 2021);*

Findings: Gains from the pandemic (primary pupils)

The pandemic impacts were not all negative. Primary teachers pointed to children who had benefited from additional adult attention, whether at home or as part of the group of vulnerable children still attending school:

> *Some previous low-achievers who have had parent involvement are now making good progress (Y6 teacher 16, November 2020);*

> *I have this small group of new children now: with that extra attention and less pressure on pace they've realised it can make sense and they can let go of what to do and really think with, and enjoy, the ideas (Primary maths coordinator 2, July 2020);*

Findings: Gains from the pandemic (A level students)

A Level students, also identified opportunities to develop independent learning habits that would support them in the medium-term:

> *I have developed an aptitude for self learning and discipline, that will stand me in good stead next year' (y13 student March 2021);*
>
> *Ability to focus on my weakness and tailor my learning to overcome these: good prep for uni (y13 student, March 2021);*
>
> *I can rewind videos teachers record and learn at my own pace' (y12 student 20, November 2020).*

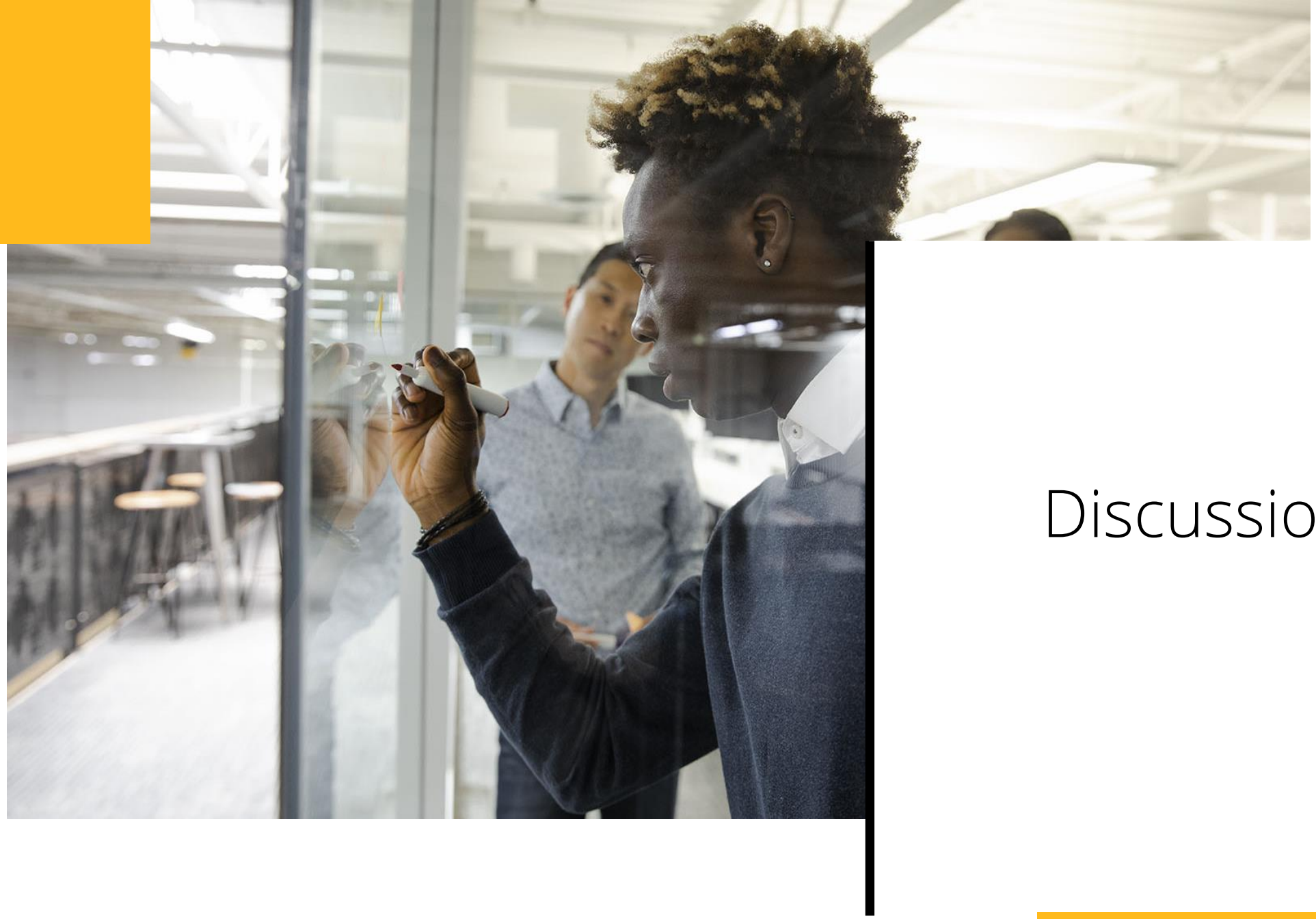
Findings: Gains from the pandemic (teachers)

A Level teachers identified only occasional, usually personal benefits such as reduced travel time.

Primary teachers pointed to both immediate and longer-term professional impacts that enhance learning, including enhanced involvement of parents:

> *Celebrating what is done at home and including parents more in the learning process by using Google Classroom to set homework and in readiness for any other future lockdowns (Primary maths coordinator 11, November 2020);*

> *It's certainly… helping me teach areas of maths that I hadn't given the time to enough before, to really think about how to deliver them. I'd say the same was very true of the learning we've started back in school... one of the things I've learnt learnt from watching the …videos, is about asking a question, pausing it. And then saying well, go and sort of think (Y6 teacher 10, March 2021).*



Discussion

Discussion (1/4)

We found aspects of the curriculum such as routine facts and procedures were reported relatively easy to teach remotely (though still not easy to learn remotely).

In both remote and back-to-school-constrained learning, what has been marginalised is the deep and connected conceptual learning and those mathematical processes and dispositions valued highly in recent curricular reforms: mathematical problem solving, reasoning and communication, and mathematical confidence, resilience, and self-efficacy.

These are harder to teach (and learn) and arguably, hardest to assess, either formatively or summatively, especially with reduced opportunity to oral, extended or open dialogue, or opportunities to probe conceptual grasp or mathematical thinking.

Discussion (2/4)

Both levels were reporting good progress in recovery of learning around curriculum ‘coverage’ and core facts and processes, however some of these harder-to-measure aspects of mathematical work appeared to be more intractable to recovery.

This seems to be true even for 16-18 year old, more mature and ‘digital native’ students.

There is currently little evidence about pandemic impact on the learning of these older students, nor direct use of student voice for such purposes.

Our data suggest that it is important to recognise that learning remotely involves a high degree of organisation and self-discipline, well beyond confidence with the technology.

Discussion (3/4)

Related professional learning appears to have impacted primary teachers' practice more, perhaps because they are usually non-specialists.

Teachers at both levels pointed to the considerable variation in impact across different students, depending on their personal characteristics and circumstances. It is easy to lose such variation in the headline messages, and averages, of large studies.

- It is also easy to lose sight of the potential learning gains from such a situation, even if for most participants, these seemed overshadowed by the challenges. Gains included:
  - mathematical and mathematics pedagogical learning for primary teachers ,
  - A Level students pointed to their learning to work independently, even if for the vast majority, that remained much more challenging.

Discussion (4/4)

The reported losses in our studies are likely to have considerable impact on medium - and long-term as well as current ‘recovery’ learning. These are not usually exposed by quick, easily-scaleable assessments, even when those are adaptive, and can be used diagnostically: it is important to consider, and make valid assessment of, the range of learning loss that we might value.

Such considerations apply to other assessments of learning: valid assessments measure the range of what we value, rather than valuing just what we can easily assess.

In particular, it is important to evidence the extent to which existing mathematics assessments address the range of curriculum purposes, capturing the identified hard-to-assess aspects of mathematical work, mathematical dispositions and long-term learning, as well as more easily-measurable skills and content.


Pearson