Adapting maths teaching for the Covid-19 period: guidance for secondary schools

Please note: This guidance is being regularly updated. If you are reading a hard or downloaded copy, please check you have the latest version at www.ncetm.org.uk/classroom-resources/teaching-maths-in-the-covid-recovery-period/. Additions to the guidance are informed by new publications 9 and 10 in the reference list, plus minor text changes. Additions are indicated by ***** in the text.

This document provides guidance to support secondary teachers while students are returning to school after a period of sustained school closures. It will also be relevant if students experience further disruptions in the future.

We recognise that the safety, and the physical and mental well-being of students, is of prime concern to teachers. Teachers will be aware that some students continue to experience significant difficulties due to the ongoing pandemic. We offer this guidance to help teachers offer a caring, positive, and stimulating classroom experience.

What might students have missed?

Content

During school closure and other intermittent disruptions, many students access online learning resources which provide them with opportunities to practise skills and techniques, and to revise previously learned topics. Whilst this is a valuable experience, it is unlikely to enable them to move on significantly with new learning. Without expert guidance from their own teachers who know the subject and the students well, students may miss out on development of deep conceptual understanding during this time.

Pedagogy

Many online learning resources offer step by step tasks and exercises, with feedback for the individual. Whilst this can be focused and supportive, it rarely provides the rich and engaging interactivity of the classroom environment, where students learn together, guided and inspired by an expert teacher. The teacher's role in planning, explaining, questioning, drawing out students' ideas, managing interactions and monitoring learning is of the utmost importance in enabling students to develop a deep and connected understanding of maths. The teacher has a crucial role in watching and listening to students, collectively and as individuals, and offering support and challenge. Allied to this, explaining thoughts and ideas to others and hearing others do the same is important for students.

How can we rebuild and reinvigorate students' learning?

In order to support students as they return to learning in school together, it is vital that attention is paid to both *what* is taught (content) and *how* it is taught (pedagogy).

Recovery content

Research indicates that following a prolonged period of school closure, student outcomes were better when 'teachers focused on "what has to be learned" instead of getting through a lot of curriculum' (2), and where teachers targeted learning to address gaps, rather than attempting full curriculum coverage (3).

Research recommendation: 'Post lockdown responses should not simply focus on catch up or remedial teaching but should also include more challenging mathematical work. Mathematics departments should adopt strategies that enable more pupils to experience positive outcomes of classroom based and remote teaching' (9)

Teachers will need to be aware that:

- after significant disruptions to school routine, students should not be expected to simply pick up content where they left off
- in any group, there will be wide variation both in *extent* and *quality* of learning that students have experienced during school closures
- teachers will need to make decisions about which areas of content to prioritise
- Some maths topics provide particularly strong underpinning of the curriculum, enabling students to build future learning on secure foundations, and these topics should be prioritised.

The NCETM Secondary Mastery Professional Development materials provide comprehensive guidance on key ideas, the knowledge that underpins them, and approaches to teaching these. (1)

Try to avoid:

- 'rushing through' a crowded scheme of work to 'catch up'; this is ineffective and can be demotivating.

Instead, try to focus on:

- securing students' deep conceptual understanding in key topics which prepare the way for future learning.

Finding out where students have made progress

Teachers will need to be aware that:

- students' experiences during school closures and ongoing disruption will be very varied. Some may be apprehensive about returning to the classroom; some will be concerned about content they may have missed.

Try to avoid:

- making general assumptions about the learning they may or may not have done during this time
- setting formal tests too early.

Instead, try to focus on:

- in-class observations, questioning and checking to find out about students' understanding and attainment; this will inform planning and reinvigorate student learning in a supportive way

- looking out for wider gaps – a prior attainment picture that is more mixed
- looking out for surprises – some students will have progressed in unexpected areas, bringing opportunities to reset learning by assigning competence in new ways.

Recovery pedagogy

***** *Research shows that 'lockdown provided very limited opportunities for any pupils to engage in mathematical talk, metacognitive activities or receive formative feedback' (9)*

Teachers will need to be aware that:

- after sustained disruptions when much of students' learning has been in isolation, it will be important to make the most of opportunities for interactive, meaningful and collaborative learning,
- effective deployment of support from the National Tutoring Programme may provide opportunities to vary groups and group sizes, and offer pre-teaching strategies for some students (4) (9)
- mathematical talk is a very important part of learning (5). Students who discuss and debate mathematical ideas grow in confidence, understanding and attainment
- the pedagogical processes referred to above are a vital element of the maths teacher's toolkit and should be used alongside other approaches such as individual study, teacher explanation and modelling, and practice exercises.

Try to make the most of the opportunities where:

- learning is interactive and takes place in whole class or group collaborative settings
- students can talk about their maths and share their ideas, whilst adhering to protocols regarding classroom layout and social distancing.

Managing productive in-class discussions and question-and-answer sessions is a high-level skill and poses significant pedagogical challenges in teaching. Students need time to get used to the expectations and protocols too. A helpful model proposed by Stein et al (6) to support such interactive and responsive teaching involves the following processes:

- **anticipating** likely student responses to cognitively demanding mathematical tasks
- **monitoring** students' responses to the tasks
- **selecting** particular students to present their mathematical responses
- purposefully **sequencing** the student responses that will be shared
- helping the class make mathematical **connections** between different students' responses and between students' responses and the key ideas.

And if there are further disruptions or closures…

***** *Research recommendation: 'Schools should be encouraged to establish distance learning and homework practices in order to prepare for any further school closures. These approaches should, as far as possible, be integrated into the schools' 'normal' classroom practice and curriculum offer' (9)*

Teachers will need to be aware that:

- if further disruptions take place, they need to be ready to return to online teaching and learning for periods of time.

- during lockdown, professional use of online platforms increased dramatically. Use of professional collaborative networks will support teachers to share good practice and become confident with new ways of teaching.
- a 'flipped classroom' approach (where students undertake some work on their own ahead of shared classroom or online activity) can help to increase the effectiveness of these strategies. (7)
- ***** when adapting face-to-face teaching for a remote/online context, it is important to keep a clear focus on learning intentions and an uncomplicated approach (10)

Try to:

- distinguish between activities that students can usefully do on their own (e.g. watching video clips, using individualised learning platforms) and those where interactivity is productive (e.g. live online teaching, Q&A via 'chat' function, in-program responses, polls, quizzes)

- ***** give regular opportunities for reasoning, thinking and discussion
- use strategies which develop students' self-regulation and metacognition (awareness of and control over one's own learning). (8) (9)

References

1. www.ncetm.org.uk/teaching-for-mastery/mastery-materials/secondary-mastery-professional-development/

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3. https://corwin-connect.com/2020/04/visible-learning-effect-sizes-when-schools-are-closed-what-matters-and-what-does-not/

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5. Lee, C. (2006) Language for Learning Mathematics. *Oxford University Press*

6. Stein, M. K., Eagle, R., Smith, M. & Hughes, E. (2008) Orchestrating productive mathematical discussions: five practices for helping teachers move beyond show and tell. *Mathematical Thinking and Learning*

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10. ***** DfE publication, October 2020: *Remote education lesson example: key stage 3 maths* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/927013/Maths_remote_education_lesson_plan.pdf