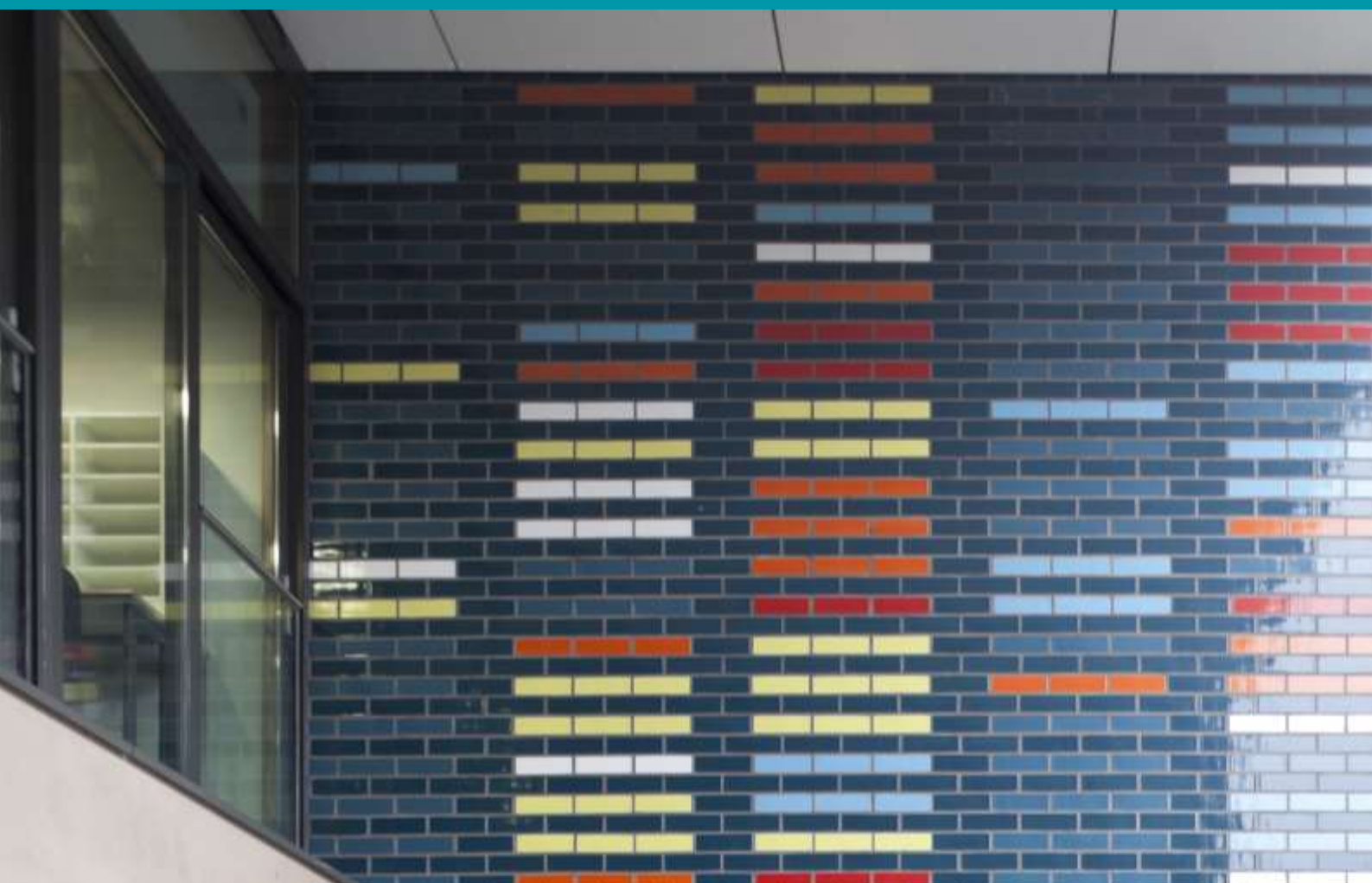


# Remote mathematics teaching during COVID-19: intentions, practices and equity



# Acknowledgements

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# Executive Summary

On 20 March 2020, schools in England closed for almost all pupils. In an attempt to mitigate the loss of around 15 weeks of normal schooling, secondary schools have provided *remote teaching* for pupils. Whilst there is a growing research base, the effects of this school closure are as yet poorly understood. To date, research during school closure has been mostly based on large-scale surveys and has only examined schools' approaches to remote teaching in very broad terms, largely focused on the early part of lockdown. Drawing on data collected later, when schools had had more time to put arrangements in place, this report presents findings about remote teaching provision and pupil participation in mathematics learning in Year 7, the first year of secondary schooling in England. The findings outline the remote teaching provided by schools during this period and how this differs by pupil prior attainment and socio-economic disadvantaged backgrounds.

The findings in this report are drawn from a survey administered in May to Heads of Mathematics in secondary schools (N=49) and follow-up in-depth interviews conducted in June with a sub-sample (N=17). The sample was drawn from a larger sample of schools participating in the Student Grouping Study<sup>1</sup>, some of whom teach mathematics by setting pupils and others by teaching pupils in mixed attainment groups.

## Findings and recommendations

**Finding 1:** Schools and mathematics departments are choosing broadly one of three options about their remote teaching provision: continuing to follow their existing mathematics curriculum as planned, following it at a slower pace and/or with reduced content, or aiming to review and consolidate previous learning.

**Recommendation:** Government and other responses to mitigating the effects of school closures, including the National Tutoring Programme, will need to be sensitive to the different needs of schools, due to different pathways taken during school closure.

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<sup>1</sup> <https://educationendowmentfoundation.org.uk/projects-and-evaluation/projects/student-grouping-study/>

**Finding 2:** Participation is unequal. Pupils with low prior attainment and other disadvantaged pupils are participating less and, when they do, they have been less engaged. Three reasons for disadvantaged pupils' low levels of participation and engagement were identified: limited access to technology; low levels of parental support and involvement with schoolwork, as well as specific 'new' personal or family-related challenges faced by vulnerable pupils during the lockdown.

**Recommendation:** Post-lockdown resources need to be carefully targeted at disadvantaged pupils irrespective of their prior attainment. Consideration should be given as to how to share and disseminate successful approaches to facilitating pupil participation.

**Finding 3:** Lockdown has restricted the opportunity to learn mathematics for most pupils; low attainers and other disadvantaged pupils have faced greater restrictions. These restrictions included a reduction in the scaffolding or additional adult support available to low prior attainers, and a more limited range of task types. A small minority of pupils have experienced unexpected benefits.

**Recommendation:** Post lockdown catch up responses, such as the National Tutoring Programme and 'recovery curricula' in schools, should not simply focus on catch up or remedial teaching but should also include more challenging mathematical work. On return to school, mathematics departments should adopt strategies that enable more pupils to experience positive outcomes of classroom-based and remote teaching.

**Finding 4:** Schools with established online learning practices and infrastructure were more readily able to move to remote teaching than others that didn't. Online resources that were familiar to teachers and pupils provided a basis to begin remote teaching, whereas schools, in which such resources for remote teaching were not established, reported obstacles to getting started with an approach they felt could work.

**Recommendation:** Schools should be encouraged to establish distance learning and homework practices during the autumn term 2020 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. There would be value in sharing effective practices and ways in which some schools have overcome obstacles and difficulties.

**Finding 5:** Lockdown has provided very limited opportunities for any pupils to engage in mathematical talk, metacognitive activities or receive formative feedback. A major disadvantage of current remote teaching practices has been the lack of opportunity for pupils to interact with teachers and with each other during their learning. Almost none of the schools facilitated live interactions between pupils, with many citing safeguarding concerns rather than technical issues.

**Recommendation:** Schools should consider ways of mitigating these restricted experiences as schools re-open; 'catch-up' support should not be limited to a remedial focus on content. In addition, they should consider ways of supporting teacher-pupil interaction during future lockdowns. There is a need for further research in this area and for software / online scheme developers to consider ways of facilitating interactions and personalised feedback. Consideration should be given to providing guidelines to schools to ensure that legitimate safeguarding concerns do not unnecessarily restrict opportunities for learning.

**Finding 6:** Due to concerns about the widening attainment gap, some changes to usual grouping approaches are being considered by Heads of Mathematics

**Recommendation:** Where changes to grouping practices are being considered, schools should take into account what research says about minimising potentially detrimental effects of attainment grouping. [Dos and Don'ts of Attainment Grouping](#) is a helpful resource (Francis et al, 2018).

# Introduction

Schools in England were closed to the majority of pupils on 20 March 2020 due to the Covid-19 pandemic, with school-based provision only for vulnerable pupils and the children of key workers. Although some secondary schools partially re-opened on 15<sup>th</sup> June, this only affected some year groups. As a result, the vast majority of Year 7 pupils have missed around 15 weeks of normal schooling, just under 40% of the school year. In an attempt to mitigate this loss, schools have provided remote, or distance, teaching for pupils. In this report, we refer to any mathematics provision offered by schools to their pupils during this time as *remote teaching*.

This has been uncharted territory for schools, teachers, pupils and parents. There was little time to prepare and, initially at least, almost no guidance or expertise available to help schools and teachers implement remote teaching. During the closure period guidance for schools and parents has been produced (Education Endowment Foundation, 2020a, 2020b). However, it is clear from rapid evidence reviews that, although there is some evidence about the effectiveness of remote teaching practices, it will take time to develop and implement optimum approaches (Education Endowment Foundation, 2020d; Müller & Goldenberg, 2020).

The impact of a period of school closures is poorly understood. The potential learning loss is estimated at between 6-10% of a standard deviation (DELVE Initiative, 2020), and the consensus is that the attainment gap between pupils from more and less disadvantaged backgrounds is likely to increase substantially (Education Endowment Foundation, 2020c; Müller & Goldenberg, 2020). One reason for this widening gap is that pupils' access to and participation in remote learning has been inequitable. Research conducted during the school closure period indicates that pupils from disadvantaged backgrounds are more likely to spend less time on remote learning than their more affluent peers (Andrew et al., 2020; Eivers et al., 2020; Green, 2020; Moss et al., 2020). Additionally, they are less likely to have access to computers (Eivers et al., 2020), a suitable space in which to work (Lucas et al., 2020) or other resources for remote learning (Andrew et al., 2020). Lucas et al. (2020) found that, although teachers from schools in the most deprived areas reported high levels of school leadership support for remote teaching, these schools struggled most to cover the curriculum. Teachers in the most disadvantaged primary schools felt it initially necessary to prioritise pupils' health, safety and wellbeing over remote teaching and learning, while those in the least disadvantaged primary schools have been more able to adapt learning activities to be enjoyable and engage the whole family (Moss et al., 2020). The latest survey evidence conducted during the last week of term suggests that, although the situation has improved, considerable inequities in participation and access remain (Teacher Tapp, 2020a).



To date, research during lockdown has been based on large-scale surveys and has only examined schools' approaches to remote teaching in very broad terms. A better understanding of schools' and teachers' approaches to pedagogy, curriculum and assessment is important to develop guidance and support for schools in providing 'catch-up' support for all pupils; it is particularly critical to ensure support for disadvantaged pupils is best designed to ameliorate the negative impact on the attainment gap. Although previous studies have considered the effects of the lockdown on disadvantaged pupils in terms of socio-economic status, little attention has been given to the impact on pupils with low prior attainment.

In England, the gap between the lowest and the highest attaining pupils widens over Key Stage 3 (Hodgen et al., 2020). Typically, secondary schools place pupils in homogenous ability classes or sets (Taylor et al., under review) and, indeed, many schools use setting as part of an overall approach to raising the attainment of disadvantaged (Macleod et al., 2015), although the research evidence suggests that this does not have an overall benefit on pupil attainment and appears to have a slight negative impact on low attaining pupils (Higgins et al., 2018). Further, a great deal of concern has been expressed about the needs of Year 6 pupils in the transition to secondary schooling (DFE, 2020; Müller & Goldenberg, 2020). However, little attention has been given to the current Year 7 cohort who have missed out on a large proportion of their transition year. Finally, existing work has largely focused on schoolwork as a whole without distinguishing between curriculum subjects. In this report, we examine the curriculum offer in one core subject, mathematics, enabling a more detailed focus on pedagogy and curriculum.

Our ongoing longitudinal investigation of attainment grouping practices in schools, The Student Grouping Study, provided an opportunity to investigate the following research questions. Specifically, we were interested to explore how attainment grouping practices of schools in our sample would be impacted by school closures and to gather evidence to support schools in the effective teaching of mathematics during potential future closure periods.

## Research questions:

1. How are mathematics teachers in schools participating in the Student Grouping Study supporting Year 7 pupils' learning during 'lockdown' due to COVID-19?
2. What specific practices are these teachers using in their attempt to meet the needs of pupils with high and low prior attainment, and how do these practices differ from their usual practices?
3. How do distance learning practices differ between 'setting' and 'mixed attainment' schools



# Methods

The sample for the present study consisted of Heads of Mathematics (HOMs) drawn from the 115 schools participating in the Student Grouping Study (Hodgen et al., 2019). These 115 schools included 33 schools that teach mathematics to mixed attainment classes<sup>2</sup> in Years 7 and 8, and 82 matched schools that teach mathematics to set classes<sup>3</sup> in Years 7 and 8.<sup>4</sup> A short survey was sent to HOMs in all participating schools, with follow-up conducted with a sample of HOMs.

## Head of Mathematics Survey

A short survey for HOMs was devised by the study team. It included mainly closed questions with options for respondents to add further information in free text boxes. The survey questions addressed the schools' remote teaching practices for mathematics in Year 7, with a particular focus on: overall aims, learning provision, meeting the needs of high and low attainers, and assessment and feedback. A single personalised link to the final survey was sent by email to each HOM. Surveys were completed in mid-May. Data collected through the survey were linked to data already held about characteristics of the respondents' schools and about details of the schools' attainment grouping practices in mathematics.

## Interviews with Heads of Mathematics

In order to explore HOMs' views on the remote mathematics provision during Covid-19 school closure in greater depth, we asked survey respondents to indicate if they would be willing to take part in interviews, yielding 17 positive responses.

A semi-structured interview schedule was designed to explore: how mathematics grouping practices for Year 7 for remote teaching differ from the usual practices; the aims of the distance learning (or remote teaching); how mathematics teaching has been adapted to meet the needs of Year 7 pupils with high and low prior attainment with a particular focus on differentiation, pedagogical and assessment practices used by teachers; and the implications of the lockdown for teaching and grouping pupils for mathematics in Year 8.

Interviews were conducted on MS Teams or by telephone, by five members of the research team in the period 1-12 June 2020. Interviews typically lasted around 45 minutes.

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<sup>2</sup> Mixed attainment classes are defined as those in which the range of attainment in each class broadly reflects the full range of attainment in the year group for that subject. Some mixed attainment schools additionally have a 'nurture group', in which the very lowest attaining students are taught separately.

<sup>3</sup> Attainment sets are defined as classes in which students are grouped by their attainment in a subject and taught together for that subject in three or more attainment sets. None of these schools use streaming where students are allocated to groups for teaching in all subjects, based on a notion of general ability.

<sup>4</sup> For full details of matching, see Anders et al. (2020).

## Sample

The characteristics of the school sample are summarised in Table 1. From the 33 mixed attainment schools participating in the Student Grouping Study, 18 HOM (55%) responded to the survey, and 10 HOM (30%) were interviewed. From the 82 setting schools participating in the Student Grouping Study, 31 HOM (38%) responded to the survey and 7 were interviewed (9%). Overall sample characteristics and response rates are summarised in Appendix A.

For the purpose of this study, schools are categorised into ‘more disadvantaged’ and ‘less disadvantaged’ based on whether the proportion of pupils eligible for free school meals in the past six years was above or below the national median (24%).<sup>5</sup>

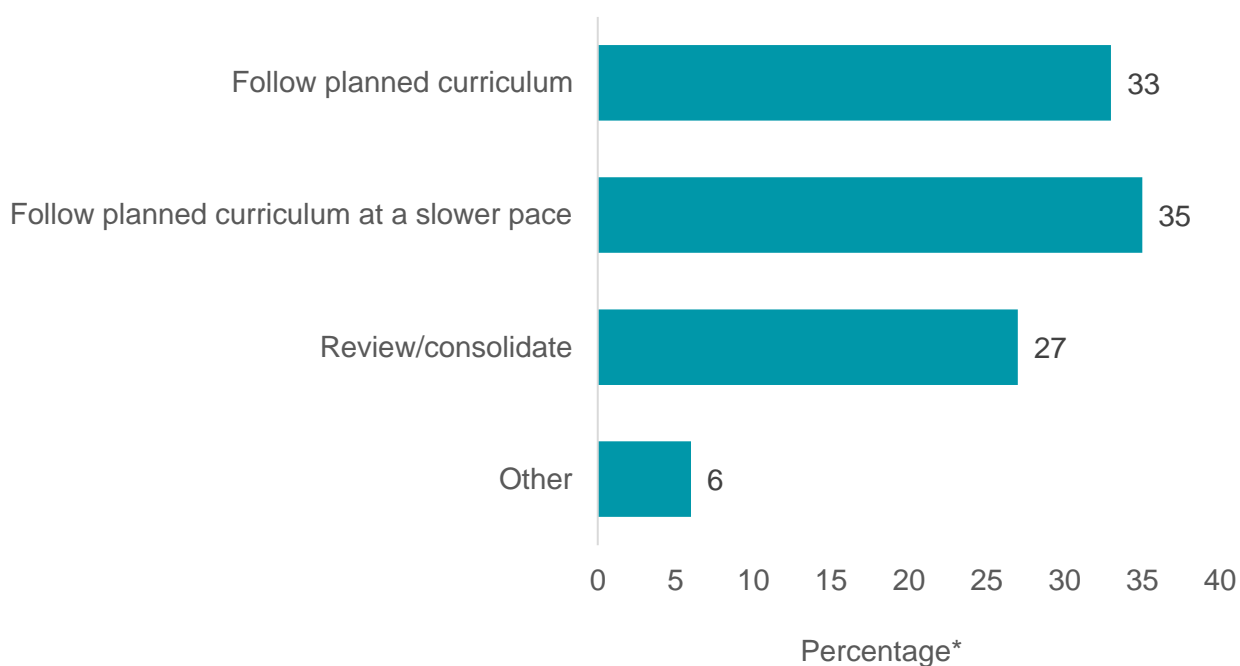
**Table 1. The characteristics of the school sample**

	<i>Total</i>	<i>Grouping Type</i>	
		<i>Setting</i>	<i>Mixed Attainment</i>
<b>Survey</b>			
<i>Schools</i>	49	31	18
<b>More disadvantaged</b>	28	16	12
<b>Less disadvantaged</b>	21	15	6
<b>Interview</b>			
<i>Schools</i>	17	7	10
<b>More disadvantaged</b>	11	4	7
<b>Less disadvantaged</b>	6	3	3

<sup>5</sup> Based on the 2017 Ever 6 FSM proportions for the 2908 secondary schools included in the matching process for the main study (Anders et al, Under review).

## Finding 1: Schools and mathematics departments are choosing broadly one of three options about their remote teaching provision

Survey evidence indicates that the aims of the majority of schools were either continuing to follow their existing mathematics curriculum as planned, following it at a slower pace and/or with reduced content, or aiming to review and consolidate previous learning (Figure 1).



\* Percentages may not sum to 100% due to rounding errors

**Figure 1. Heads of Mathematics' responses to the multiple choice question 'What is your school's main aim for Year 7 pupils' learning in mathematics while the school is closed to most pupils? Please select one.'**<sup>6</sup>

There were no differences in aims between mixed attainment and setting schools ( $\chi^2(3, N = 49) = 1.40, p = .707$ ) or between schools with higher/lower proportions of disadvantaged pupils ( $\chi^2(3, N = 49) = 5.57, p = .135$ ).

A broadly similar pattern was found in the interviews with HOMs. Decisions to move on to new content or not were influenced by different factors such as the belief that consolidation work was easier to set while teachers adapted to the situation, avoiding a widening attainment gap between groups of pupils or attempting to ensure pupils' mathematical confidence was not damaged.

<sup>6</sup> Of the 49 schools, 16 (33%) reported their approach as follow the curriculum as planned; 17 (35%) as follow the curriculum, but at a slower pace; 13 (27%) as review and consolidate previous learning in mathematics; and, 3 (6%) as other.

*... the potential for children to feel demoralised, we felt, was less if they were seeing things that they've already seen, at least to an extent, rather than trying to get their head around lots of new material.*

(Setting, less disadvantaged)

Five of the HOM's interviewed reported that the aims and provision originally set had been adapted over the closure period. These amendments resulted from changes in staffing availability leading to a shift to online lessons for larger groups; a realisation that the closure would be prolonged, so new content had to be introduced; or a need to improve pupil engagement.

*...we had to tweak some of the work slightly for some students and maybe focus on just some basic maths really, just so they would engage with it.*

(Mixed attainment, less disadvantaged)

Several other schools also reported that they were intending to make further adaptations to their remote provision by exploring synchronous teaching.

**Recommendation:** Government and other responses to mitigating the effects of school closures, including the National Tutoring Programme, will need to be sensitive to the different needs of schools, due to different pathways taken during school closure.

## **Finding 2: Participation is unequal. Pupils with low prior attainment and other disadvantaged pupils are participating less and, when they do, they have been less engaged.**

All the HOMs reported the schools were providing work and, in many cases, relatively large amounts of work. Indeed, just over half the HOMs surveyed (53%) reported that pupils were asked to spend 3 hours on mathematics learning per week. There was no difference between mixed attainment and setting schools, or schools with higher/lower proportions of disadvantaged pupils. For most schools the expected mathematics learning time was similar to (50% of schools) or somewhat less than (37% of schools) the amount of time pupils would usually be expected to engage in learning mathematics.

HOMs reported that pupil participation was markedly lower than these expectations. Indeed, in many schools, relatively large proportions of pupils were not participating in mathematics learning. Using school data, more than one-third of the HOMs interviewed estimated that at least 30 percent of Year 7 pupils were not participating regularly in remote learning, some citing non-participation rates as high as 70-90 percent. One HOM observed that remote learning provided particular challenges in terms of encouraging pupils to participate.

*Last week I'm talking maybe 90 students didn't do the work that we set for them. In school that would probably be an assembly about 'Hold on a second, why aren't you doing the lessons that your teachers are planning and putting in place for you. This needs to change.'*

(Mixed attainment, more disadvantaged)

In contrast, in some schools, participation appeared to be relatively high. A third of the HOMs interviewed indicated that participation was over 70 percent. Schools who had comparatively high levels of participation tended to have a below national median proportion of disadvantaged pupils. Some HOMs emphasised that pupils' actual participation in mathematics learning was likely to be much lower than these participation figures suggest:

*Just because someone has clicked on a link doesn't mean that they've actually engaged with the activity that is there.*

(Setting, less disadvantaged).

Moreover, uneven participation and engagement were mediated by two main factors: prior attainment and disadvantage. Pupils in bottom sets and nurture groups disproportionately fell into the low engagement group during the school closure period.

*We've definitely found that students with higher prior attainment are engaging more. The engagement rates, for example, in the top set are about 90%. [...] Engagement rate in the bottom set are around 30 to 40%.*

(Setting, less disadvantaged)

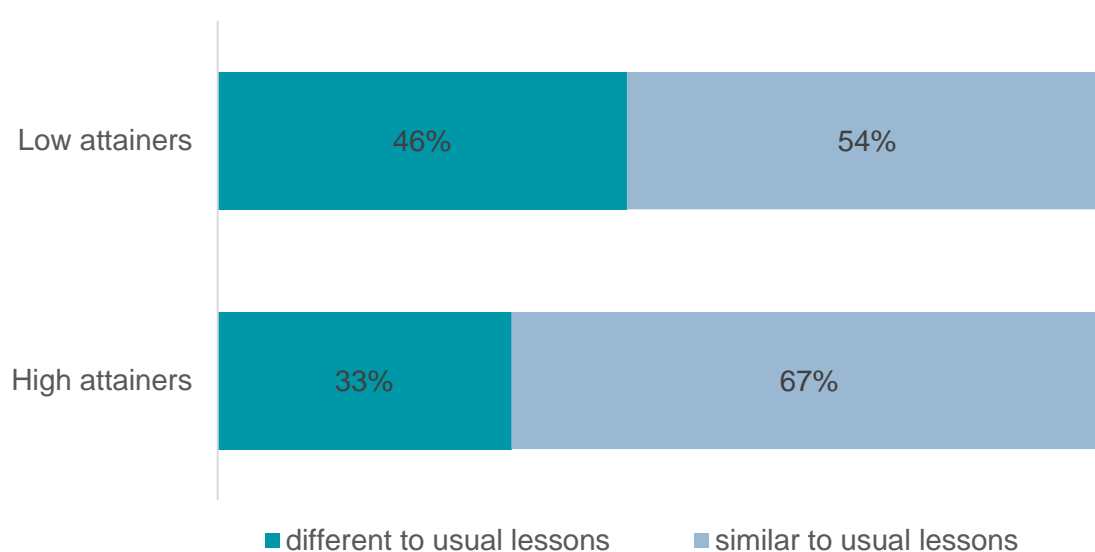
However, disadvantage was also very important. Three reasons for disadvantaged pupils' low levels of participation and engagement were identified: limited access to technology; low levels of parental support and involvement with school work, as well as specific 'new' challenges faced by vulnerable pupils during the lockdown, including bereavement, having to move between households of separated parents, having parents who are unable to dedicate their time to home schooling, living with older relatives who were shielding and the like; and difficulties in adequately addressing the needs of SEN and EAL pupils remotely. Disadvantage was also found to impact on high attaining pupils, leading to lower motivation and reduced ability to engage with remote provision.

**Recommendation:** Post-lockdown resources need to be carefully targeted at disadvantaged pupils irrespective of their prior attainment. Consideration should be given as to how to share and disseminate successful approaches to facilitating pupil participation.



### **Finding 3: Lockdown has restricted the opportunity to learn mathematics for most pupils; low attainers and other disadvantaged pupils have faced greater restrictions. A small minority of pupils have experienced unexpected benefits.**

All HOMs interviewed reported that, as a result of remote teaching, they had to make changes from how their pupils would usually experience mathematics, particularly in relation to content offered and the level of cognitive demand within tasks (see also Finding 1). Survey evidence indicated that pupils with low prior attainment were significantly more likely to have a different experience of mathematics provision compared with pupils with high prior attainment ( $\chi^2(9, N = 49) = 41.83, p = .001$ ) (see Figure 2).



**Figure 2. Similarity of school provision for Year 7 pupils with high prior attainment and low prior attainment, compared with usual practices**

In addition, pupils with low prior attainment attending schools with a higher proportion of disadvantaged pupils were more likely to have a different experience of mathematics provision compared with usual ( $\chi^2(3, N = 49) = 9.14, p = .027$ ) than those in schools with a lower proportion of disadvantaged pupils.<sup>7</sup>

<sup>7</sup> Of the 49 HOMs surveyed, 23 (46%) reported that, for pupils of low prior attainment, their experiences of mathematics learning were different or very different to usual, compare to 16 (33%) for pupils of high prior attainment. 14 (50%) reported that, for more disadvantaged pupils, their experiences of mathematics learning were different or very different to usual, compared to 9 (43%) for less disadvantaged pupils. 8 (44%) reported that, for pupils with low prior attainment studying in mixed attainment schools, their experiences of mathematics learning were different or very different to usual, compared to 15 (48%) for pupils with low prior attainment studying in setting schools.

There was additionally a marginally near-significant effect of setting and mixed attainment grouping: the experiences of pupils with high prior attainment taught in sets was more similar to usual than the experience of high attainers taught in mixed attainment groups ( $X^2(3, N = 49) = 6.40, p = .094$ ). However, no equivalent significant difference was observed for pupils with low prior attainment taught in sets or mixed attainment groups ( $X^2(3, N = 49) = 4.13, p = .248$ ).

The interviews revealed how these differences were limiting the experiences pupils would typically have in school. For example, five HOMs reported a reduction in the scaffolding or additional adult support available to low prior attainers:

*the lower end, obviously in school, you'd have a really small group of students, you'd have a teacher, you'd have a teaching assistant in there with them, and if someone was really struggling, you could really offer them bespoke support.*

(Setting, more disadvantaged)

Several HOMs reported in interviews that a more limited range of task types than would normally be used, in particular a reduction in opportunity to solve problems in favour of routine practice.

*There is a danger that the more that time goes on, the more that students think that maths is about [...] watching a clip and doing some maths, [...] the more likely we are to lose some of them. We're not able to do the inspirational stuff because it's just utterly unfair to set that sort of thing for parents to do.*

(Mixed attainment, more disadvantaged)

Some HOMs reported that the reduction in task variety also led to a reduced level of challenge for the high attaining pupils,

*there's again, less challenge in the independent work that students have to do [...] we've given less concern to students being challenged and more concern to making sure that everyone can access what's being put out there.*

(Mixed attainment, more disadvantaged)

Two HOMs reported doing something slightly different for their lower prior attaining pupils to ensure that they had some mathematics they could access.

*we are keeping our middle to higher on the same curriculum as they would be covering so each week they are doing a new piece of learning and a revision piece of learning and our lower ability sets are just doing two revision pieces of learning unless we see that the new piece of learning is something that they can possibly do.*

(Setting, more disadvantaged)

HOMs also reported removing some content from the Y7 syllabus particularly topics that required the use of equipment or visualisation, e.g. geometry.

There have been unexpected positive benefits for a minority of pupils from distance learning, including for 'quiet' and 'less confident' pupils:

*Particularly our quiet pupils, the ones who wouldn't put their hand up in a lesson. Particularly our quiet girls, we're finding they're really starting to thrive in this environment. Less distractions in the classroom, they're able to rewatch a video and so on, so they could really get what they specifically need whereas sometimes they don't always ask for that.*

(Setting, more disadvantaged)

A few low attaining pupils surprised teachers by doing more and higher quality work than in the classroom. One HOM suggested that such pupils might have received individualised help from parents or older siblings, but the majority of interviewees attributed this improvement to fewer distractions in the home environment.

*[...] in a school context they don't always engage that much in the classroom but somehow sat at home in front of a computer screen they seem to be engaging a little bit.*

(Mixed attainment, more disadvantaged)

For some other pupils, this period of school closure was an opportunity to develop as independent learners. These pupils, however, seemed to disproportionately be high attainers who could self-regulate their learning.

**Recommendation:** Post lockdown catch up responses, such as the National Tutoring Programme and 'recovery curricula' in schools, should not simply focus on catch up or remedial teaching but should also include more challenging mathematical work. On return to school, mathematics departments should adopt strategies that enable more pupils to experience positive outcomes of classroom-based and remote teaching.

## **Finding 4: Schools with established online learning practices and infrastructure were able to more readily able to move to remote teaching than others that didn't.**

The news that schools would close came rapidly and, with no system-level guidance, schools had a very short amount of time to respond with decisions about how to continue providing mathematics learning for their pupils.

Schools in the survey drew on a broad variety of online provision (See Appendix B.) 64% of schools were providing their own teaching and learning materials online/through a 'virtual learning environment' and 71% of schools had recommended pupils access other mathematics learning activities online.

Nine of the 17 HOMs interviewed referred to using, in some way, online resources that they knew their teachers and pupils were familiar with prior to lockdown which provided some form of launch-pad to begin remote teaching immediately.

One HOM reported how fostering independent learning had been a priority this academic year,

*...Hegarty Maths [...] is our new homework software this year. [...] the students have been used to a weekly homework task. We follow the exact model of students watching a video then copying out the examples then engaging with the quiz that Hegarty recommend. But beyond, we've really tried to embed this independent learning, and we created what we call independent learning lists which is linked to all the appropriate clips for students.*

(Setting, more disadvantaged)

Other HOMs, in schools where such resources for remote teaching were not established, reported obstacles to getting started with an approach they felt could work.

*When we first started lockdown we had about three or four attempts until we felt this was working and I think what we have got now is probably the best we can possibly get under the circumstances.*

(Setting, more disadvantaged)

Two schools of the 17 interviewed had anticipated the closures and begun making plans for provision two or three weeks beforehand. Both schools were estimating around 50% engagement of Y7 pupils at the time of the interview.

One of the unexpected consequences of remote teaching related to the general 'up-skilling' of many teachers in terms of the use of ICT. A number of HOMs described a collegial environment where teachers with prior experience with education technology such as Google Classroom shared their expertise across the department. Several HOMs also discussed the benefits of remote provision in terms of careful and creative planning done by teachers to maximise the engagement of pupils with online resources. Many schools planned to continue to use the newly developed and/or tested bank of online resources next year.

**Recommendation:** Schools should be encouraged to establish distance learning and homework practices during the autumn term 2020 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. There would be value in sharing effective practices and ways in which some schools have overcome obstacles and difficulties.

## **Finding 5: Lockdown has provided very limited opportunities for any pupils to engage in mathematical talk, metacognitive activities or receive formative feedback.**

All the HOMs were clear that a major disadvantage of current remote learning practices has been the lack of opportunity for pupils to interact with teachers and with each other during their learning.

One HOM said the teachers in their school encouraged pupils 'to have an inner monologue or debate with themselves', while acknowledging that the experience would not be as rich as a discussion with a partner in the classroom (mixed attainment, more disadvantaged). Another HOM was concerned that high attainers were missing out on opportunities 'to articulate, verbalise and question and quiz and wonder as much' (mixed attainment, more disadvantaged). Low attainers in mixed attainment schools were missing out on being exposed 'to high quality maths language and answers' in the classroom:

*... a low prior attaining student in a class [benefits] from listening to answers and conversations, mathematical conversations we're having in our classroom [...] Obviously, that is very difficult and doesn't really happen within the remote learning because we can't really get that side of the classroom to happen."*

(Mixed attainment, less disadvantaged)

Almost none of the schools facilitated live interactions between pupils, with many citing safeguarding concerns rather than technical issues. The one HOM who reported being able to do this described using a 'chat' function during a live lesson:

*So pupils will make comments. Other pupils will respond from that and then you will get a series of interconnected responses, so I'm just sitting back, watching the chat take place whilst they're talking to each other and helping to answer each other's questions. [...] So it's just then I'm just letting it happen, I don't need to get involved in it.*

(Mixed attainment, more disadvantaged)

Our survey found that although pupils in 93% of schools received marks either from a teacher or through online automatic marking at least weekly, 46% of schools provided comments on pupils' work less frequently. 40% of schools had stopped testing Y7 pupils to track progress in mathematics.



In interviews, most HOMs reported that their assessment approaches centred around automatic marking built into online platforms such as Hegarty Maths, MathWatch, Dr Frost Maths, etc. These platforms enabled teachers to track the completion of the mathematical tasks, analyse mistakes and target general, high level feedback at common misconceptions for the whole class. One HOM stated that assessment had been most successful where teachers were *'engaging with the information that's coming back'* (setting, less disadvantaged). Several HOM stressed that teachers were setting subsequent work based on the data derived from work completed by pupils online.

Some teachers expressed frustration about providing formative feedback due to lack of live interaction with pupils. While their classroom approach typically involved questioning pupils *'to help them get to that point'* and *'to really unlock what they are doing'*, in remote provision pupils were passively observing and following *'a modelled explanation of how to do something'* (mixed attainment, more disadvantaged). The feedback was delayed and usually limited to answering pupils' questions over email or a weekly live session that disadvantaged pupils were less likely to attend.

**Recommendation:** Schools should consider ways of mitigating these restricted experiences as schools re-open; 'catch-up' support should not be limited to a remedial focus on content. In addition, they should consider ways of supporting teacher-pupil interaction during future lockdowns. There is a need for further research in this area and for software / online scheme developers to consider ways of facilitating interactions and personalised feedback. Consideration should be given to providing guidelines to schools to ensure that legitimate safeguarding concerns do not unnecessarily restrict opportunities for learning.

**Finding 6:** Due to concerns about the widening attainment gap, some changes to usual grouping approaches are being considered by heads of mathematics.

All HOMs in schools with mixed attainment practice seemed committed to mixed attainment in Year 8. However, three HOMs pointed out specific changes planned to support those pupils who have fallen behind. A HOM in a disadvantaged school, discussed plans for providing support to groups of pupils outside of the mathematics lessons:

*The only thing might be that where we have pull-out groups for intervention, not during the maths lessons but during other times of the day for maths [...] but in terms of the whole class itself, the grouping practice will remain the same.*

(Mixed attainment, more disadvantaged)

Two HOMs were planning for different catch-up approaches that included introducing elements of grouping by mathematics scores:

*We may have to go to some sort of hybrid model of when the exposition of new topics comes then they're all together and when the practice is there they might have to be separate so they can get the support that they need.*

(Mixed attainment, more disadvantaged)

All HOMs in setting schools planned to continue to set in Year 8. However, the majority decided to halt the movement of pupils between sets till later in Year 8 to have time to understand the gaps in knowledge and for the reasons related to pupil wellbeing.

*What we don't want to do is get the children back in school and give them a test because it would, I think it would just be really demoralising and soul-destroying for the pupils.*

(Setting, more disadvantaged)

HOMs in schools using setting also suggested strategies for addressing the widening attainment gaps between pupils. Although not linked to alteration in grouping approaches, the following were mentioned: delaying teaching new content by one term, teacher differentiation within the lesson, boot camps, teaching low attainers in even smaller groups with an additional teacher.

**Recommendation:** Where changes to grouping practices are being considered, schools should take into account what research says about minimising potentially detrimental effects of attainment grouping. [Dos and Don'ts of Attainment Grouping](#) is a helpful resource (Francis et al, 2018).

## Conclusion

In this report we have presented findings about remote teaching provision and pupil participation in mathematics learning in Year 7, the first year of secondary schooling in England. At the start of lockdown, schools in England had very little prior experience of remote teaching, very limited time to plan for it and access to very little advice and guidance. Schools had little choice but to adopt an *emergency* rather than planned responses to remote teaching (Hodges et al., 2020). As a result, the mathematical learning experiences were more limited and restricted for all pupils in comparison to their usual lessons. There were very limited opportunities for feedback, interaction with teachers, for pupils to engage in metacognitive tasks or to express their mathematical ideas verbally. However, the mathematical experiences of low attaining pupils were significantly more likely to be different, and more restricted, than usual lessons in comparison to high attaining pupils. We also found inequities in pupil participation; pupils from more disadvantaged backgrounds were more likely to spend less time on and have less access to remote learning.

The consensus of research conducted to date is that the attainment gap between pupils from more and less disadvantaged backgrounds is likely to increase substantially as a result of the school closures (e.g., Education Endowment Foundation, 2020c; Müller & Goldenberg, 2020). Our findings have added weight to this research evidence and additionally indicated that the gap between low and high attainers is also likely to increase considerably. Identifying ways to address this growing gap is a matter of urgency.

Our study has highlighted some strategies and approaches with potential, and we have provided recommendations for schools and teachers moving forward, as they ensure all pupils have the opportunity to learn, irrespective of their prior attainment or level of disadvantage.

## Appendix A: Characteristics of schools in the sample

**Table A1. Description of schools in the interview sample**

<i>School</i>	<i>Grouping for mathematics</i>	<i>Ofsted category*</i>	<i>IDACI**</i>	<i>Ever 6 FSM*** (national median 24%)</i>	<i>Location</i>
Blackbird Secondary School	Mixed attainment	2	3	Above	Urban, South West
Goldcrest Academy	Mixed attainment	1	5	Above	Urban, London
Dove Secondary School	Mixed attainment	2	5	Above	Urban, North West
Dunnock Secondary School	Mixed attainment	2	4	Above	Urban, London
Goldfinch Secondary School	Mixed attainment	2	5	Above	Urban, London
Greenfinch Academy	Mixed attainment	1	3	Below	Urban, South West
Jay Secondary School	Mixed attainment	2	5	Above	Urban, London
Magpie Academy	Mixed attainment	2	1	Below	Rural, East of England
Woodpecker Secondary School	Mixed attainment	3	3	Above	Urban, South East
Tawny Academy	Mixed attainment	2	1	Below	Rural, North West
Lapwing Secondary School	Setting	2	3	Below	Urban, South East
Chaffinch Secondary School	Setting	1	1	Below	Rural, East of England
Nuthatch Secondary School	Setting	2	2	Above	Urban, South East
Robin Secondary School	Setting	3	4	Above	Urban, North West
Sparrow Academy	Setting	3	2	Below	Urban, South West
Starling Academy	Setting	2	4	Above	Urban, West Midlands
Kestrel Secondary School	Setting	2	3	Above	Urban, North West

\* **Ofsted category:** 1: outstanding, 2: good, 3: satisfactory, 4: inadequate.

\*\* **IDACI:** quintile groups of the Index of Deprivation Affecting Children and Infants of the pupils in the whole school. IDACI scale indicates 1 as the least deprived to 5 as the most deprived.

\*\*\* **Ever 6 FSM:** pupils who have been eligible for free school meals at any point in the last six years.

**Table A2. A comparison of characteristics between the schools in the Student Grouping Study sample that did and that did not participate in the survey**

		Setting	Mixed attainment
<i>Region</i>			
Participated ( <i>frequency</i> )	London	2	6
	Midlands	4	2
	North	10	5
	South	15	5
Did not participate ( <i>frequency</i> )	London	4	5
	Midlands	11	0
	North	19	3
	South	17	7
<i>Ofsted</i>			
Participated ( <i>frequency</i> )	Outstanding (1)	7	6
	Good (2)	18	9
	Requires Improvement (3)	5	3
	Inadequate (4)	1	0
Did not participate ( <i>frequency</i> )	Outstanding (1)	9	7
	Good (2)	32	6
	Requires Improvement (3)	7	2
	Inadequate (4)	3	0
<i>Number of schools that have above/below national median in relation to the proportion of the 2018 GCSE cohort who have been eligible for free school meals at any point in the last six years</i>			
Participated	Above national median	16	12
	Below national median	15	6
Did not participate	Above national median	25	10
	Below national median	26	5
<i>Location = Rural hamlet, Rural town, Rural village, Urban city and town, Urban major conurbation, Urban minor conurbation. All rural areas were then categorised as 'rural'; All urban areas were then categorised as 'urban'</i>			
Participated ( <i>frequency</i> )	Rural	3	2
	Urban	28	16
Did not participate ( <i>frequency</i> )	Rural	10	2
	Urban	41	13
<i>Proportion of the 2018 GCSE cohort who are EAL (%)*</i>			
Participated		14.35	34.72
Did not participate		13.20	26.73



	Setting	Mixed attainment
<i>Total number of pupils in 2018 GCSE cohort i.e. proxy for school size</i>		
Participated ( <i>frequency</i> )	169	178
Did not participate ( <i>frequency</i> )	173	183
<i>KS2 average point score of the 2018 GCSE cohort</i>		
Participated	28.43	28.35
Did not participate	28.43	28.19
<i>Proportion of the 2018 GCSE cohort who are "low attainment" based on their KS2 scores (%)</i>		
Participated	13.90	14.00
Did not participate	13.67	15.40
<i>Proportion of the 2018 GCSE cohort who are "average attainment" based on their KS2 scores (%)</i>		
Participated	45.00	46.72
Did not participate	46.02	44.73
<i>Proportion of the 2018 GCSE cohort who are "high attainment" based on their KS2 scores (%)</i>		
Participated	41.19	39.44
Did not participate	40.31	39.93

\* Among the schools that participated in the survey, the mixed attainment schools had significantly more pupils with English as an Additional Language compared to the setting school ( $F(3, 111) = 5.14, p < .005$ ). No other significant difference was observed in the school characteristics between the mixed attainment and setting school that did and did not participate in the survey.

## Appendix B: Summary of online resources/ mathematics learning platforms used

Online Platform	Number of schools using online resources	URL	Description	Classification
Corbett	2	<a href="https://corbettmaths.com/">https://corbettmaths.com/</a>	Freely available, videos, worksheets for teachers to use links in own materials	Maths resource website
DESMOS	1	<a href="https://www.desmos.com/">https://www.desmos.com/</a>	Freely available software tools and digital classroom activities for teachers to use links to in own materials.	Maths resource website
Diagnostic Questions	2	<a href="https://diagnosticquestions.com/Home/Questions">https://diagnosticquestions.com/Home/Questions</a>	Free (login required) receptacle of multiple choice maths questions	Maths resource website
Doddle	1	<a href="https://www.doddlelearn.co.uk/app/login">https://www.doddlelearn.co.uk/app/login</a>	Work sharing online platform; subscription	General education platform
Dr Frost	2	<a href="https://www.drfrostmaths.com/">https://www.drfrostmaths.com/</a>	Freely available, videos, worksheets for teachers to use links in own materials	Maths resource website
Eedi	1	<a href="https://eedi.com/">https://eedi.com/</a>	Free (login required) receptacle of multiple choice maths questions	Maths resource website
Google Classrooms	4	<a href="https://edu.google.com/products/classroom/?modal_active=none#%2Fready-to-go">https://edu.google.com/products/classroom/?modal_active=none#%2Fready-to-go</a>	Work sharing online platform; subscription	General education platform
Hegarty	9	<a href="https://hegartymaths.com/">https://hegartymaths.com/</a>	Personalised maths learning platform, subscription	Mathematics learning platform
MathsPad	1	<a href="https://www.mathspad.co.uk/">https://www.mathspad.co.uk/</a>	Subscription only, videos, worksheets for teachers to use links in own materials	Maths resource website
MathsWatch	3	<a href="https://vle.mathswatch.co.uk/vle/">https://vle.mathswatch.co.uk/vle/</a>	Personalised maths learning platform, subscription	Mathematics learning platform
Mr Carter Maths	1	<a href="https://mrcartermaths.com/">https://mrcartermaths.com/</a>	Subscription only, videos, worksheets for teachers to use links in own materials	Maths resource website
My Maths	2	<a href="https://www.mymaths.co.uk/">https://www.mymaths.co.uk/</a>	Subscription only, videos, worksheets for teachers to use links in own materials	Mathematics learning platform
Numbots	1	<a href="https://play.numbots.com/#/intro">https://play.numbots.com/#/intro</a>	Subscription personalised mathematics practice platform	Mathematics learning platform
Oak Academy	2	<a href="https://www.thenational.academy/">https://www.thenational.academy/</a>	Freely available, videos, worksheets, lessons, curriculum for teachers to use links in own materials	Maths resource website
Parallel Maths	1	<a href="https://parallel.org.uk/">https://parallel.org.uk/</a>	Free (login required) online maths challenges	Maths resource website
See Saw	1	<a href="https://web.seesaw.me/seesaw-for-schools">https://web.seesaw.me/seesaw-for-schools</a>	Work sharing online platform; subscription	General education platform
Show My Homework	4	<a href="https://www.teamsatchel.com/products/smhw.html">https://www.teamsatchel.com/products/smhw.html</a>	Work sharing online platform; subscription	General education platform
TT Rockstars	1	<a href="https://trockstars.com/">https://trockstars.com/</a>	Subscription personalised timestable practice platform	Mathematics learning platform

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This resource is also available on our website  
<http://www.ucl.ac.uk/ioe/studentgroupingstudy>

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*Remote mathematics teaching during COVID-19: intentions,  
practices and equity*

**The Student Grouping Study**

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