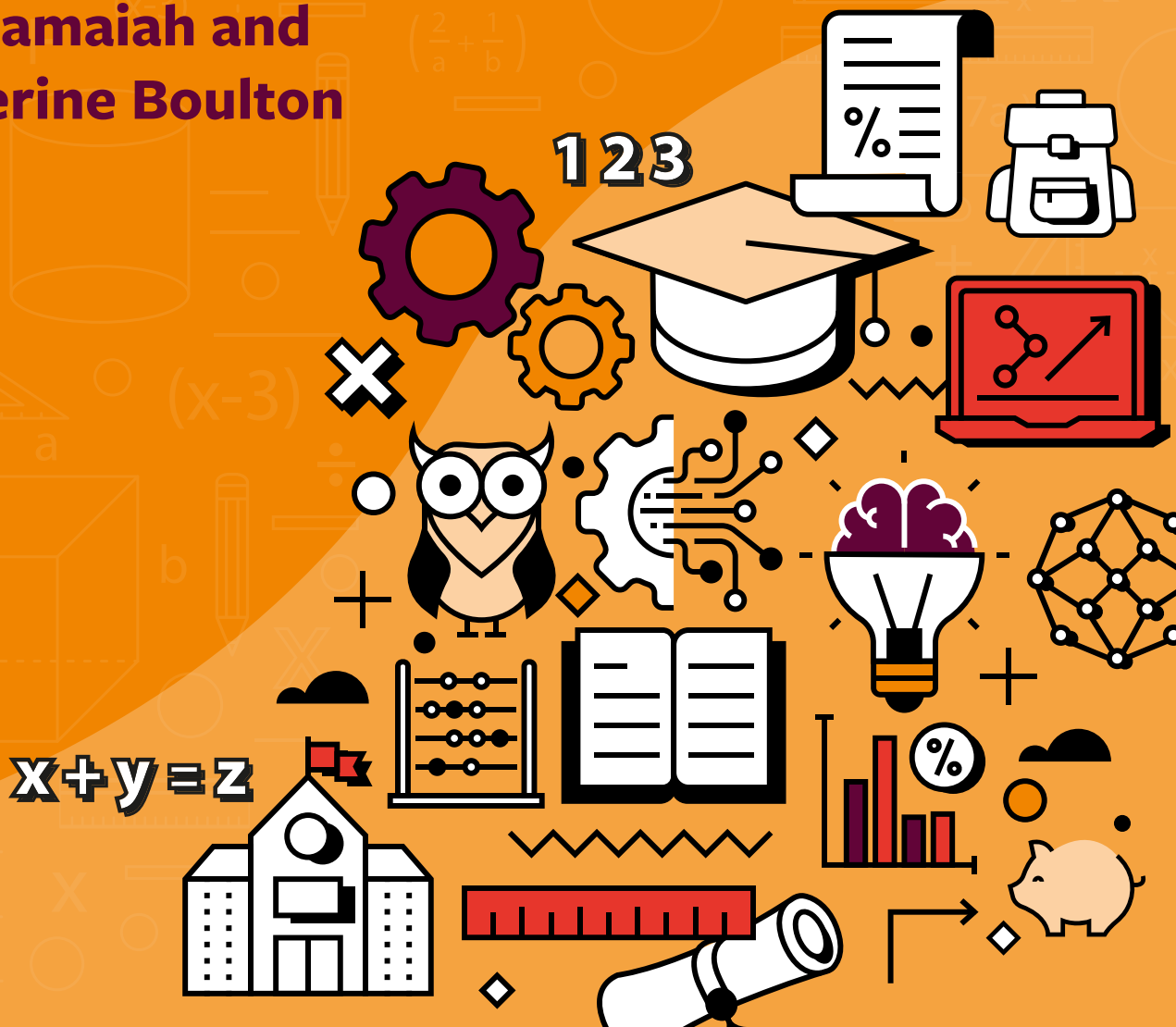
THIRD SPACE LEARNING

The Centre for Education & Youth

# A Space for Maths

## Exploring the need for maths tutoring and the potential role of Third Space Learning

**Loic Menzies, Baz Ramaiah and Catherine Boulton**

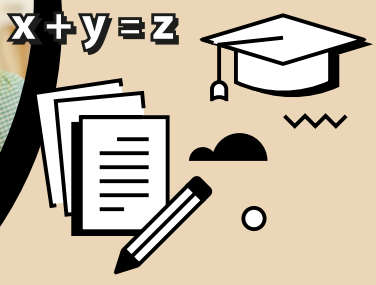


The Centre for Education & Youth

CfEY is a think and action tank – we believe that society has a duty to ensure that children and young people receive the support they need in order to make a fulfilling transition to adulthood. We provide the evidence and advice that policy-makers and practitioners need to support young people. We help organisations develop, evaluate and improve their work with young people. We also carry out academic and policy research and advocacy that is grounded in our experience.

THIRD SPACE LEARNING

Third Space Learning was established in 2013 to help tackle the maths attainment gap by providing online one-to-one maths tuition to pupils in English state schools. They have delivered over one million sessions to more than 90,000 pupils, of which 45% have been eligible for Pupil Premium. Third Space Learning's model involves recruiting and training specialist maths tutors in South Asia. This enables them to provide maths tuition at a price schools can afford, and at a scale that can support the large number of pupils in need of extra help. All tutoring programmes are delivered in school and directed by teachers to ensure they supplement class teaching.



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# Foreword 1

**Loic Menzies**
Chief Executive,
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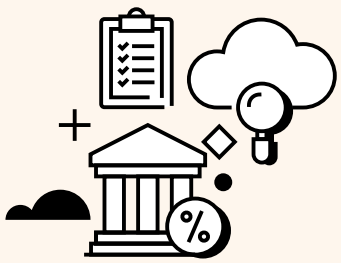
*July 2021*



The first door that closed to me because of my lack of maths skills shut at A-level.

I had realised that I was at sea in my chemistry lessons and, although in retrospect I should have done something about catching up, I decided to drop the subject. The chemistry lab door turned out to be the first of several doors to close because of gaps in my maths skills.

In conducting the research for this report, I discovered that I am not unusual in that my battles with maths started early in Key Stage 2. Funnily enough, I have distinct memories of being confused by fractions in Year 4 – an area where early difficulties have now been shown to be highly predictive of future struggles.

The question that underpins this report is therefore: what could help pupils who – even before they leave primary school – start to doubt their potential to achieve in maths? Third Space Learning, who commissioned this report, believe that tutoring could help, and an increasing number of parents and teachers agree with them. I can see why; returning from secondary school one evening after yet another maths lesson spent clutching my head in frustration, my parents decided to call up a friend who was a retired maths teacher. They asked her to spend an hour with me at the weekend explaining what I'd failed to grasp in class. Having that one-to-one time was deeply reassuring, as if a tangled ball of misconceptions was finally unwrapping. But unfortunately, not everyone has parents able to do what mine did that week. Access to one-to-one support has historically been deeply inequitable.

The difficulties with maths learning that I've described above are perennial ones and will be familiar to many. However, what has changed since 2020 is that most pupils have now missed out on at least six months of schooling due to covid school closures, and unfortunately, data suggests that this has had a devastating impact on many pupils' learning. It also seems that disadvantaged pupils are the ones who have been worst impacted by 'learning loss' and that the situation is worse in maths than in English.

This report is therefore intended to review the evidence to gauge the scale of learning loss in maths; to show why it matters; and to ask what contribution tutoring might make to the national response.

We argue that learning loss in maths is indeed deeply worrying and that it risks having an extremely damaging impact on disadvantaged pupils. Luckily, tutoring offers considerable promise as a means of helping pupils to bounce back. We acknowledge that there are big challenges involved in developing a successful solution, not least the scale of need. However, by drawing up a specification for an effective solution and comparing Third Space Learning's current model and track record to this, we find that there is potential for tutoring to help.

Ultimately, I hope that the lessons in this report will ensure that doors do not keep closing for the many pupils who find themselves struggling in maths.

# Executive Summary 2

Extensive evidence has demonstrated the scale of pupils' learning loss over the course of the Covid-19 pandemic, with the Institute for Fiscal Studies estimating a potential £350 billion loss of lifetime earnings for pupils (Sibieta, 2021).

Disadvantaged pupils have suffered more than their peers and, as a result, socioeconomic attainment gaps have widened, particularly in maths (Education Endowment Foundation, 2021a). Parents from poorer families have particularly acute concerns in relation to lost learning (Farquharson et al., 2021).

Maths skills have a profound long-term impact on both individuals and society, and early difficulties in maths tend to be compounded as pupils move through their education. This drives a particularly strong link between maths attainment at Key Stages 2 and 4. There is therefore an urgent need to tackle learning loss in maths, particularly at primary school level.

Education systems are currently grappling with how to ensure pupils make accelerated progress. There are no obvious or proven ways of making up lost ground. However, researchers, teachers, parents and government in England have all recognised that tutoring offers one of the 'best bets' for tackling learning loss.

Historically, research on tutoring has disproportionately focused on reading. This is despite the fact that the available evidence points to a number of reasons why maths tutoring might hold particular promise, especially if deployed early on in Key Stage 2.

Several factors need to be taken into account if tutoring is to achieve its potential and drive the educational recovery from the pandemic.

These include:

- delivering the scale of support required, but with a limited and relatively inelastic workforce;
- using research evidence to design interventions that maximise the chances of impact, for example by deploying skilled tutors and building links between tutoring activities and classroom practice;
- overcoming a range of practical barriers to impact such as inequitable access, technological difficulties and risks around non-attendance;
- doing all of the above at an affordable price.

Third Space Learning commissioned The Centre for Education and Youth (CfEY) to review their delivery model, tracking data, case studies and teachers' and school leaders' recent feedback. This review suggests that the organisation meets many of the requirements for an effective solution to learning loss. It therefore has the potential to play an important role in helping pupils bounce back from the pandemic.

The organisation has already demonstrated its ability to dramatically scale up delivery in a short space of time, and it has the potential to continue doing so rapidly. Its delivery model includes a range of features highlighted in the research as contributing to effective tutoring and it has a good track record of implementing its approach smoothly. It is also able to do all of the above at an affordable price.

# Introduction 3

Historically, private tutoring has tended to refer to paid-for additional learning that takes place outside of normal school hours – often at home or in dedicated tutoring centres. However, this trend is beginning to shift and *A Space for Maths* speaks directly to this rapidly changing context.

Extensive research has been published on uptake of and access to traditional forms of tutoring, demonstrating how these vary across the globe, as well as considerable disparities in uptake within nations – notably by age group, socioeconomic characteristics and demographics.

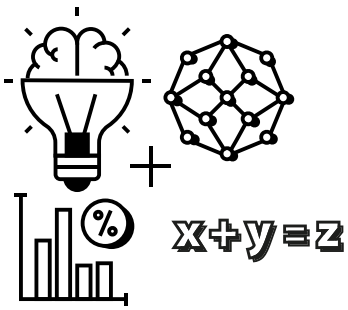
Demand for tutoring has increased steadily in England since at least the year 2000. Polling by the Sutton Trust shows that the proportion of students aged 11–16 in England and Wales who received private or home tuition rose from 18% in 2005 to 27% in 2019 (Sutton Trust, 2019). Meanwhile, data from the Trends in International Mathematics and Science Study (TIMSS) suggests that in 1994–95 around 11% of Year 8 students in England had extra lessons in maths but that this had increased to 21% by 2003 (Richardson et al., 2020).

Despite increasing uptake, data from the Programme for International Student Assessment (PISA) shows that tutoring remains far less common in England than in comparator nations within the survey; 21% of 15-year-olds in England receive one-to-one maths tuition compared with 26% of pupils in Hong Kong and 38% of pupils in Greece (Jerrim, 2017). Some researchers have suggested that increasing uptake is due to the growing importance of high-stakes assessments. Others who study variations in uptake across different jurisdictions question this link and instead identify an association between tutoring and 'institutional factors' such as access to education and levels of funding (Baker et al., 2001; Ireson, 2004; Ireson & Rushforth, 2009).

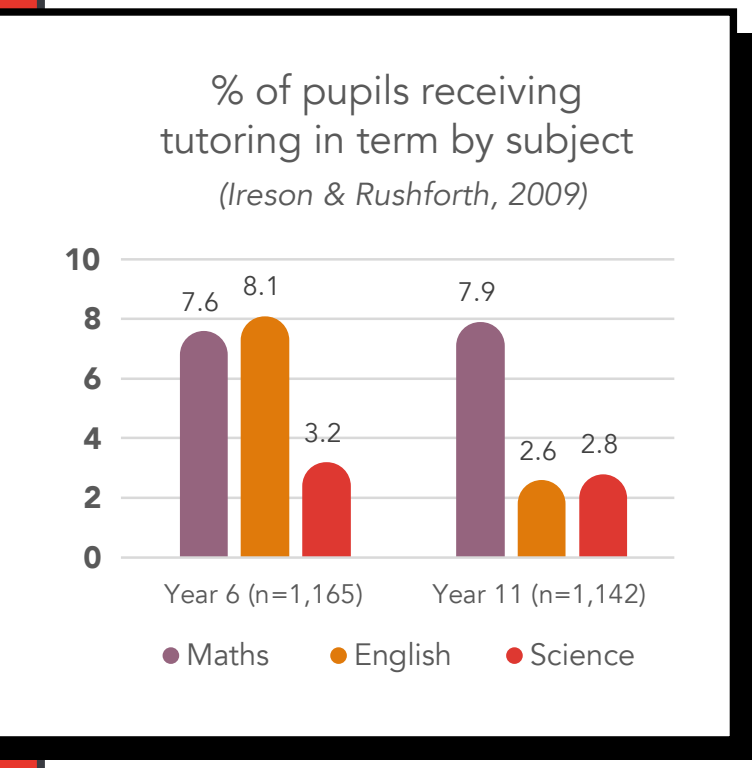
Parents' motivations for purchasing private tutoring vary, but improving their child's success in examinations is a key factor, as is a desire to raise their confidence (Ireson & Rushforth, 2014). Pupils are most likely to receive tutoring in the run-up to major public exams, notably at the end of primary school, and in advance of GCSE exams. This trend is consistent with motivations for engaging in tutoring, with students saying that the main reason for receiving tutoring is to do better in tests or exams. On the other hand, younger age groups are more likely to state that tuition is there to help them learn subjects quicker (Ireson & Rushforth, 2009).

In analysing motivations for taking part in tutoring, the global TIMSS survey distinguishes between a desire to 'keep up' in class and a desire to 'excel'. Year 9 pupils in England who receive tutoring are equally split between these two motivations, whereas in Japan, for example, 'excelling' is a more common motivator. Meanwhile in Italy, 'keeping up' is the predominant driver (Richardson et al., 2020).

> "Parents in our survey identified two additional drivers, namely to improve understanding of a subject and increase confidence, which were ranked in the top three reasons for employing a tutor. Improved understanding and appreciation of a subject may be key aspects of students' motivation to learn as they underpin enjoyment of a subject for its own sake, while improved confidence may encourage a student to continue taking a subject in the future. Interestingly, parents' rankings are very similar to those of students, who also place increased understanding and confidence in their top three reasons for having a tutor."
>
> **Ireson & Rushforth, 2014**



In England, at primary school level, uptake of tutoring in English and maths is similar, though marginally higher in the former. Uptake then diverges considerably at secondary school where pupils are far more likely to be tutored in maths than they are in science or English (Ireson & Rushforth, 2009).




## A changing landscape

The introduction of the Pupil Premium and the publication of the Education Endowment Foundation's (EEF's) Teaching and Learning Toolkit[1] marked a turning point in the evolution of tutoring in England. As a result, tutoring is increasingly recognised as a tool in schools' armoury of approaches for tackling educational inequality. However, interventions – and research on their efficacy - have tended to focus on reading rather than maths and this may constitute a missed opportunity.

Shifts in the tutoring landscape has been compounded and accelerated by the Covid-19 pandemic and the Department for Education's decision to launch a National Tutoring Programme (NTP). This programme was initially intended to provide tutoring for "up to 2 million" disadvantaged pupils (Gibbons, 2020), an ambition that was then scaled up – despite challenges in meeting the initial target – with a pledge to provide up to 6 million tutoring programmes.

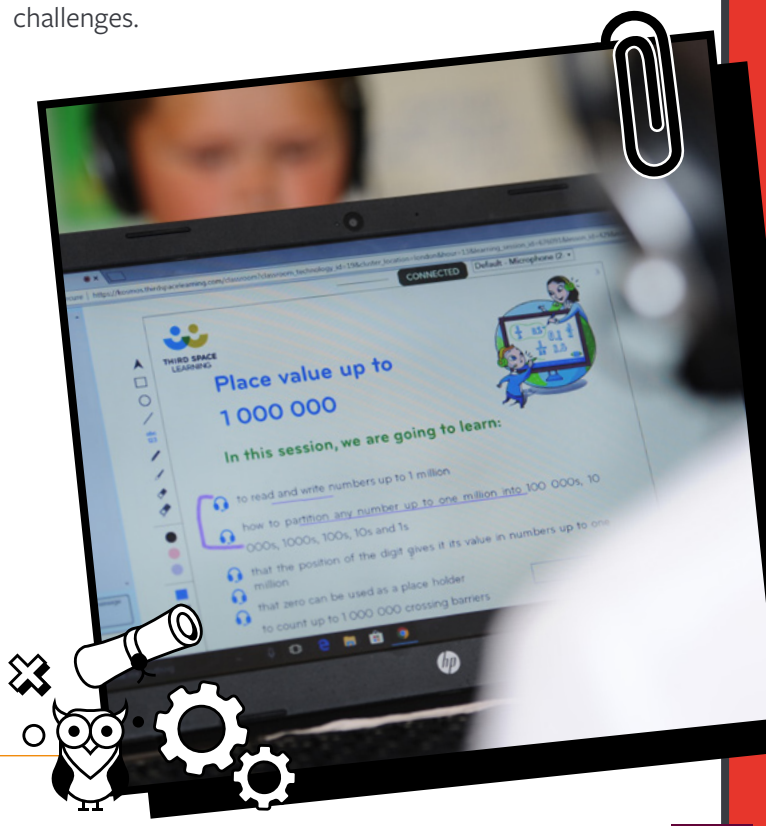
These rapid changes have driven a transformation in the tutoring sector, with tutoring now frequently taking place in school. Meanwhile, the commissioner of tutoring is increasingly the school rather than the parent and, rather than being disproportionately the preserve of the affluent, tutoring is now frequently targeted at more disadvantaged pupils.

However, increasing demand for tutoring has not been matched by a commensurate increase in supply, given the relatively inelastic supply of skilled labour, particularly in maths, alongside the need to maintain affordability when serving schools with tight budgets. Ongoing disruption to education as a result of the pandemic has also precipitated a simultaneous shift towards online delivery.

2021 therefore represents a year of considerable upheaval in the tutoring sector, but it also presents an opportunity for tutoring to make a far more equitable and coordinated contribution to accelerating learning and enhancing equity by closing achievement gaps.

This report is therefore intended to set out the extent and nature of the need for tutoring, particularly in maths, as well as the type of challenges that might be involved in meeting this need. Based on this, we set out the requirements for a solution and how Third Space Learning might meet these requirements.

*A Space for Maths* is, by its nature, a critical but pragmatic review in that it brings together the currently available evidence on needs and then draws on Third Space Learning's available data to begin to assess how the organisation might address these unprecedented challenges.




[1] https://educationendowmentfoundation.org.uk/evidence-summaries/teaching-learning-toolkit/

# Maths achievement and the Covid-19 pandemic

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## Summary

Maths skills have a profound long-term impact on both individuals and society. Early difficulties in maths tend to be compounded as pupils move through their education. This drives a particularly strong link between maths attainment at Key Stages 2 and 4.

Extensive evidence has demonstrated the scale of pupils' learning loss over the course of the Covid-19 pandemic, with the Institute for Fiscal Studies estimating a potential £350 billion loss of lifetime earnings for pupils (Sibieta, 2021).

Disadvantaged pupils' learning has suffered more than that of their peers and, as a result, socioeconomic attainment gaps have widened, particularly in maths (Education Endowment Foundation, 2021a). Parents from poorer families have particularly acute concerns about lost learning (Farquharson et al., 2021).

There is therefore an urgent need to tackle learning loss in maths, particularly at primary school level.



## The crucial role of maths achievement

Disadvantaged pupils disproportionately suffer from the educational, social and economic consequences that result from poor maths skills. This has long-term social and economic repercussions.

## The educational importance of early maths achievement

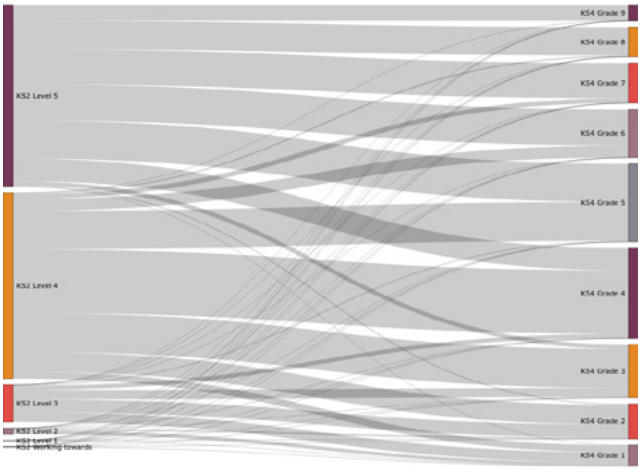
Even before the pandemic, maths was one of the subjects in which the gap between pupils who were eligible for the Pupil Premium and those who were not was the highest – equivalent at GCSE to 17.5 months of learning, compared with 16.2 months in English (Hutchinson et al., 2020).

A key reason why maths attainment at primary school is such a concern is that links between Key Stage 2 performance and later educational achievement are particularly strong in the subject. Using Department for Education data (Department for Education, 2019b) we calculated Spearman's rank correlations between pupils' Key Stage 2 and Key Stage 4 scores in English and Maths. This gave a correlation of 0.70 for Maths compared to 0.55 for English demonstrating that the link is stronger in Maths than in English[2]. In other words, pupils who do poorly in maths early on find it harder to turn this around and achieve highly at the end of secondary school compared with pupils who do poorly in English at Key Stage 2, who have a somewhat higher chance of going on to do well despite early difficulties.

[2] Spearman's correlation coefficient, (signified in the diagram on the next page by $r_s$) is a statistical test used to measure the strength and direction of association between two ranked variables. Analysis was conducted using data from all state schools as well as the subset of all *mainstream* state schools. Findings were consistent across both samples.

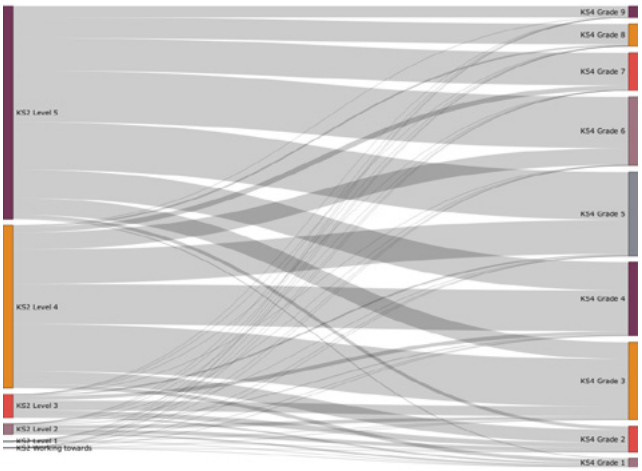
# Transitions at Key Stages 2–4

(based on the Department for Education's 2019 Statistical First Release 1, Table 7, all state schools)




$r_s$=0.70

## Maths




$r_s$=0.55

## English

*The above diagram shows the KS4 grades pupils achieve in English and Maths, splitting this out by their KS2 Achievement. The link between achievement at Key Stage 2 and 4 is stronger in Maths than in English.*

Aubrey et al. (2006) look further back into pupils' educational journeys and find that mathematical achievement in the very first years of primary school is also highly predictive of later mathematical achievement. Meanwhile, analysis of both US and UK datasets shows that knowledge of fractions at the age of 10 is particularly predictive of "high school maths achievement". This holds "above and beyond the effects of general intellectual ability, other mathematical knowledge, and family background" (Siegler et al., 2012).

A number of explanations have been proposed as to why early achievement in maths is so important, and 'maths anxiety' is believed to play a particularly important role (Dowker et al., 2016).

> "Math anxiety during childhood, in particular, has adverse long-term consequences for academic and professional success."
>
> **Supekar et al., 2015**

The key mechanisms by which maths anxiety translates into disruption to learning are that it drives pupils to avoid mathematical activity and that it can overload and disrupt working memory during mathematical tasks (Dowker et al., 2016).

Challenges around maths anxiety are compounded by the fact that when parents feel anxious about maths, they can transmit this to their children when helping them with homework. This can in turn be linked to poorer pupil achievement (Maloney et al., 2015). Meanwhile, Evans and Field show that a range of factors linked to parents and home-environment factors play an important role in determining children's achievement in maths:

> "Parental education qualifications, a harmonious parent–child relationship and school involvement at age 11 are substantial predictors of maths attainment trajectories."
>
> **Evans & Field, 2020**

# The social consequences of poor achievement in maths

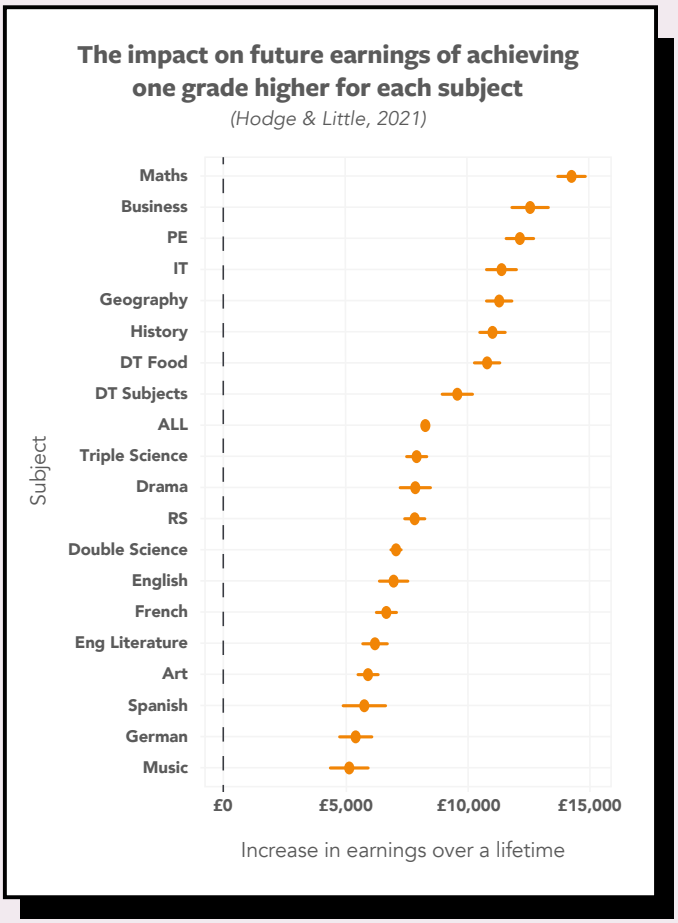
Difficulties with maths have long-term social consequences. In a 2014 survey, around a third of adults reported that they have felt held back by poor maths or numeracy. Working with measurements and quantities, understanding statistics in the media and helping children with homework were the most commonly reported challenges (YouGov/National Numeracy, 2014).


Research has explored the link between numeracy and financial capability, arguing that certain financial decisions require financial numeracy (Carpena et al., 2011). Meanwhile, a UK study assessed the proportion of the population with the necessary written and numerical literacy to understand commonly available health information. The authors concluded that 61% of the population were below the threshold needed to make sense of the content (Rowlands et al., 2015). The charity National Numeracy therefore argues that poor numeracy is a considerable barrier to health, suggesting that it affects people's ability to self-manage chronic healthcare issues and make healthy choices (National Numeracy, 2018).

# The economic consequences of poor achievement in maths

The negative consequences of difficulties in maths are not just felt by individuals, they also impact on wider society and the economy.

A recent large-scale study from the Department for Education showed that the marginal return on an extra GCSE grade in maths was approximately double that of an extra grade in English (Hodge & Little, 2021).




Meanwhile, research commissioned by National Numeracy estimates that the 16 million workers in the UK with low numeracy skills are currently earning an average of nearly £1,600 less per year than they could do if they had a basic level of numeracy. It therefore concludes that £25 billion could be added to earnings in the UK if people's numeracy skills improved (Pro Bono Economics, 2021). Furthermore, the Confederation of British Industry (CBI) reports that just over half of employers are aware of weaknesses in their employees' core competencies in numeracy (CBI, 2015).

Analysis by Pro Bono Economics estimates that the overall cost of low numeracy to the UK economy is around £20.2 billion per year, or about 1.3% of Gross Domestic Product (GDP) (Pro Bono Economics, 2014). This estimate is considerably higher than a previous estimate by KPMG, which calculated a social cost of £2.4 billion per year, but which did not take into account the cost of suppressed income. Nonetheless, even the lower estimate still led KPMG to conclude that providing high-quality numeracy interventions to 35,843 Year 3 pupils with very low literacy skills could save the public purse £1.6 billion over time (Gross et al., 2009).

## The pandemic's disproportionate impact on maths learning

Evidence points to marked learning loss in maths as a result of the Covid-19 pandemic, which exceeds losses in other areas such as English. This has disproportionately affected disadvantaged pupils, which is perhaps not surprising given the particular issues around parent–pupil interactions in maths highlighted above.

In January 2021, the Department for Education released analysis comparing pupils' attainment in the first half of the autumn term 2020, with pupils' attainment in previous years. The analysis focused on year groups 3 to 9 and showed that, on average, pupils were three months behind in maths (Renaissance Learning & Education Policy Institute, 2021). Further studies by the National Foundation for Educational Research and GL Assessment have reached similar conclusions (Education Endowment Foundation, 2021a).

Rising Stars Assessment's data shows that disadvantaged primary learners have fallen further behind their peers in maths, but its research finds some improvement over the course of the autumn term 2020, suggesting some catch-up (Blainey & Hannay, 2021). Nonetheless, it estimates that the Year 6 Pupil Premium group could now be around 7 months behind the non-Pupil Premium group in maths. It calculates that the average gap in maths between pupils who were eligible for the Pupil Premium and those who were not, across all year groups, grew from about 5 months in 2019 to about 6 months in 2020.

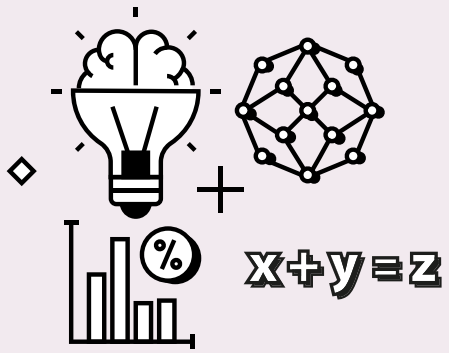
According to Blainey and Hannay, it is Year 1, 3 and 5 pupils whose attainment has suffered most. However they found that the gap in Maths achievement between disadvantaged and their more advantaged peers grew the most among pupils in Years 4,5 and 6. Learning loss as a whole has also been more pronounced in schools in deprived areas.

> "Children who were already low-attaining, those eligible for the Pupil Premium and those attending schools in more deprived areas tended to show greater declines in attainment than their peers. This indicates that pre-existing educational disparities have been exacerbated by school closures and lockdown."
>
> **Blainey & Hannay, 2021**

FFT Datalab also found a post-school-closure widening of the disadvantage gap, but unlike Rising Stars Assessment it did not see a reduction in gaps during the autumn term 2020. They estimate a 10% to 24% widening of the gap in maths but no discernible change in the reading gap (Weidmann et al., 2021).

## Conclusions

- Underachievement in maths has considerable personal, social and economic repercussions and disadvantaged pupils disproportionately suffer these consequences.
- The Covid-19 pandemic has had a profoundly negative impact on pupil learning and educational inequality. These consequences are particularly acute in maths.
- The English education system needs to respond to learning loss in maths fast, because early difficulties in the subject tend to be compounded over time and make it harder for pupils to go on to do well in the future.



# The Role of Maths Tutoring in the Educational Recovery

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## Summary

Education systems around the world are currently grappling with how to ensure pupils make accelerated progress. There are no obvious and proven ways of making up lost ground. However, researchers, teachers, parents and government in England have all recognised that tutoring offers one of the 'best bets' for tackling learning loss.

Historically, research on tutoring has disproportionately focused on reading. This is despite the fact that the available evidence points to a number of reasons why maths tutoring might hold particular promise, especially if deployed early on in Key Stage 2.

Given the above, the supply of tutoring needs to be scaled-up rapidly and the impact of doing so monitored closely. However doing so will involve a number of challenges.


## Tutoring as a means of accelerating learning

Tutoring has been identified by the Department for Education – using evaluations by the Education Endowment Foundation (EEF) – as an effective and economically viable means of reducing the attainment gap between disadvantaged pupils and their peers (Department for Education, 2021c). The EEF equates the potential gains of one-to-one tuition to 5 months of additional learning. But the scale of impact in the studies it reviewed varies considerably, and of the 16 studies cited in its summary report, only four relate to numeracy/maths interventions (Education Endowment Foundation, 2021b).

Focusing in on these four studies reveals that two are American meta-evaluations that include a mix of English and Maths interventions, and two focus on specific maths/numeracy specific programmes. The latter two show effect sizes of 0.21 (Rutt et al., 2014) and 0.33 (Torgerson et al., 2011). According to the EEF's methodology these equate to 3 and 4 months of learning respectively.

Meanwhile, although an EEF evaluation of a maths tutoring intervention (provided by Third Space Learning), conducted in 2014, did not show an impact on learning, this is perhaps not surprising given that the trial was only designed to detect relatively large changes in pupils skills (effect sizes of 0.33 or above), which were unlikely given that a number of schools in the control group (who did not receive the intervention) deployed other tutoring activities. The trial also took place in the early stages of the programme's development, before key technical issues (discussed later in this report) had been resolved (Torgerson et al., 2016).

Ireson & Rushforth (2005, 2014) suggest a number of reasons why tutoring might have a greater impact in maths than in English and these tie in closely with some of the pedagogical issues explored earlier in this report:

- parents' difficulties with maths;
- parents' lack of familiarity with current teaching methods;
- high levels of pupil anxiety.

Support from tutors could provide a way of shortcutting the effects of parents' and pupils' maths anxiety. For example, in a small-scale trial reported in the Journal of Neuroscience, Supekar et al. demonstrate that an 8-week one-to-one cognitive tutoring programme led pupils to feel increasingly comfortable with maths and to go on to achieve more highly (Supekar et al., 2015). These findings are consistent with a 2018 study of over 1,000 primary school pupils in England, which demonstrated a reciprocal relationship between enjoyment/low boredom of maths and subsequent academic achievement (Putwain et al., 2017). A 2021 EEF evaluation of an online tuition pilot also reported improvements in learners' confidence (Marshall et al., 2021).

> "This tutor ... knows the kind of things they do in the curriculum now which is something ... if I started trying to help him with his maths I'd be showing him how I used to do it however many years ago and it would be all wrong."
>
> **Parent, quoted in Ireson & Rushforth 2014**

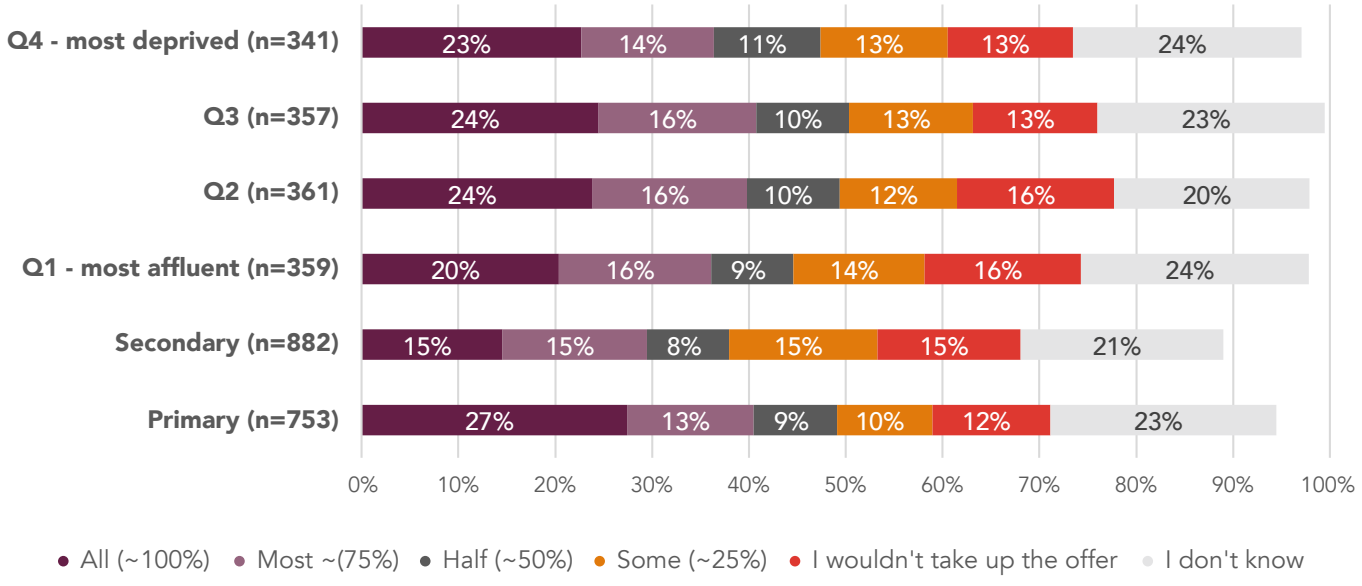
# Teachers' and parents' desire for post-pandemic tutoring

Many head teachers recognise the value of tutoring and 20% cite online tutoring as being the single most helpful intervention to help disadvantaged pupils during school closures (Montacute & Cullinane, 2021). The Sutton Trust found that 17% of secondary head teachers stated that one-to-one and small-group tuition was their priority for Pupil Premium spending in 2020/21 (Sutton Trust, 2021). This made it the most popular choice whereas in 2020 it was the fourth most popular choice.

Primary school senior leaders were much less likely to pick one-to-one/small-group tuition as their top choice. At primary school level, early intervention, extra teachers and additional teaching assistants were all more popular (Sutton Trust, 2021). On the other hand, another survey, this time by Teacher Tapp, showed that nearly half of all school senior leaders (46%) say they would take up small-group tutoring for at least a quarter of their Pupil Premium students if it were available at £10 per hour. According to this research, appetite was slightly higher in primary schools and in the most deprived settings, as shown in the graph below.

Imagine your school is offered high-quality small-group tutoring (e.g. 1:3) for disadvantaged pupils at a cost of £10 per hour per pupil. How many of your Pupil Premium/Free School Meals pupils would you put in for this?

*(Teacher Tapp, August 2020)*

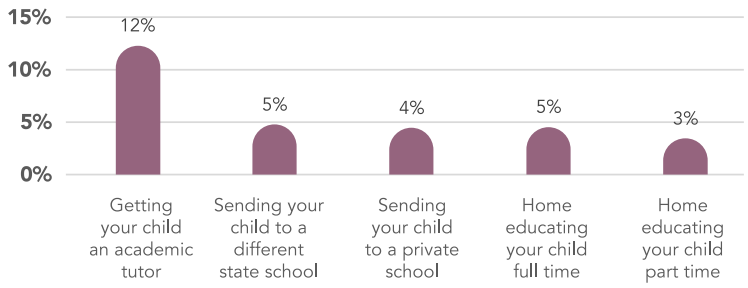


According to Parent Ping's recent poll, more than 1 in 10 parents have considered getting their child an academic tutor in response to lockdowns, making it the most popular response (Parent Ping, 2021). Tutoring was also the most popular catch-up policy among parents according to polling by the Institute for Fiscal Studies (Farquharson et al., 2021).

"As a result of the Covid-19 lockdown and home learning have you considered…"

*(Parent Ping Survey, March 2021)*

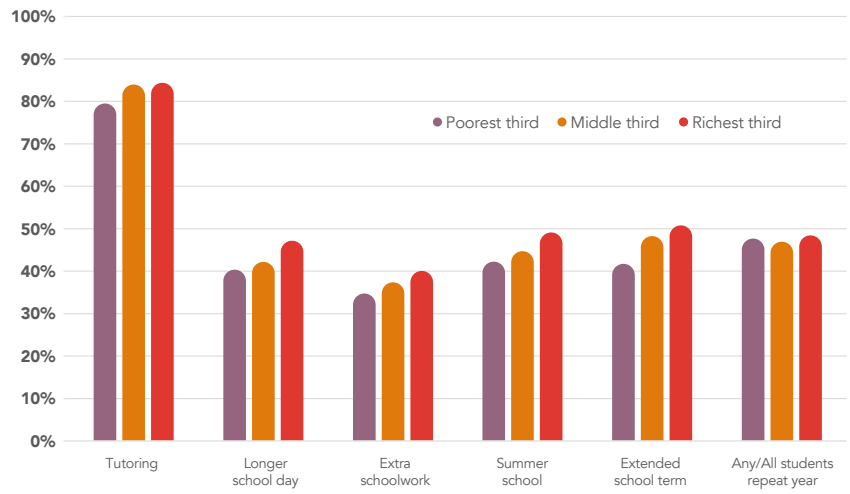
(n=2,118)




Parents' support for specific academic catch-up policies, by pre-Covid family earnings

*(Farquharson et al., 2021)*

(n=5,858)




Parent Ping's polling shows broadly similar levels of appetite for tutoring across Key Stages, with a slight spike at Key Stage 2 and Key Stage 4 where pupils are taking national exams. Responses were also similar regardless of whether a parent's child was eligible for Free School Meals or not (11% as against 13%) and this finding is corroborated by the Institute for Fiscal Studies' polling, which shows high levels of support across all income groups (Farquharson et al., 2021).

# The scale of the challenge

The needs and opportunities set out above mean that the scale of response required is huge. If the 1.74 million pupils who are eligible for the Pupil Premium (Department for Education, 2021b) were to access 15-hour tutoring courses in 2021/22, this would require over 26 million hours of tutor time, and the Education Policy Institute has called on government to commit to maintaining this scale of delivery over the next three years.

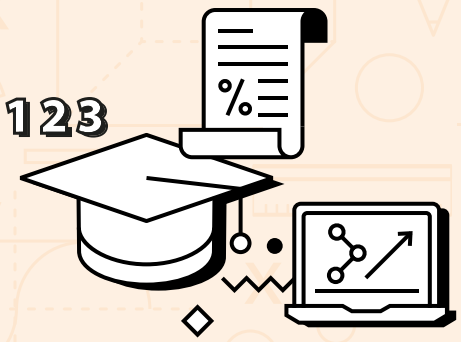
Yet current measures and funding are insufficient to meet needs and ambitions. For example, in October 2020 the TES reported that although the National Tutoring Programme was designed to reach "up to 2 million of England's most disadvantaged children", initial funding was only sufficient for 250,000 pupils, in other words, 17% of pupils in receipt of Free School Meals (TES, 2020). Moreover, additional funding in February 2021 was linked to a target of only 8,686 extra pupils (National Tutoring Programme, 2021a). However, in June 2021 this funding was considerably increased, with the stated goal of delivering 6 million 15-hour tutoring courses (Department for Education, 2021a) – in other words, 90 million hours of tutoring.

Achieving these ambitious delivery targets will require unprecedented capacity, yet it is unclear where this capacity will come from. There are neither large numbers of maths teachers, nor maths graduates on standby; maths has long been one of the subjects where it is hardest to meet teacher recruitment targets (Worth et al., 2018), let alone recruit an additional workforce of suitably qualified tutors. The costs of growing the tutor workforce to the required scale would also be extremely high given that the average salary for a 'Mathematical Science' graduate just one year after graduating was already £24,000 in 2015/16 (Department for Education, 2019a).

Questions of labour supply are of course linked to questions of who delivers tutoring (which are explored in the following section), since tutoring interventions have in the past been delivered by various different individuals, ranging from volunteers to teaching assistants and highly qualified maths teachers.

## Conclusions

- An extensive body of evidence suggests that tutoring can be an effective way of increasing attainment and closing attainment gaps, although the precise scale of impact varies between studies.
- Studies of tutoring tend to focus on English – and reading in particular. It is therefore hard to gauge how much impact maths tutoring has. However, the small number of maths-specific studies that are available show that extra one-to-one or small-group support can boost learning. Research also points to a number of reasons for hypothesising that the 'size of the prize' could be even greater in maths than in other subjects.
- The scale of the need for maths tutoring, the extent of likely demand and the government's stated ambitions all exceed readily available supply.



# Developing and delivering high-quality maths tutoring

6

## Summary


Learning loss in maths is clearly a problem in need of an urgent solution and tutoring provides one of the best available responses which now needs to be scaled up rapidly.

However, a number of factors need to be taken into account when doing so, notably:

- maximising the chances of impact through the deployment of skilled tutors and high-quality programme design;
- overcoming a set of practical constraints, including equity of access, technological difficulties and the risk of poor attendance

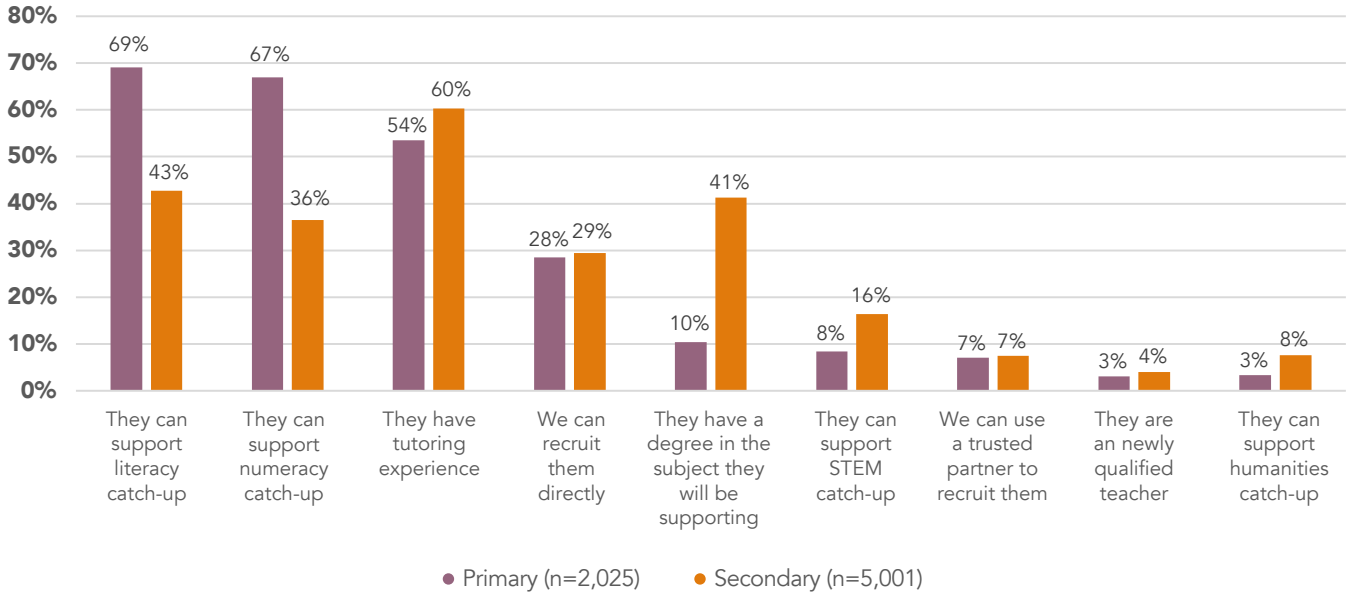
All of this needs to happen whilst maintaining affordability.


## Meeting schools' requirements

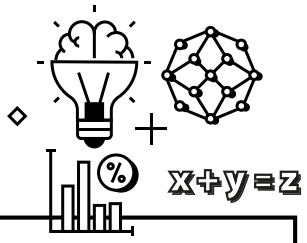
When asked what they want from tutors, teachers emphasise slightly different characteristics depending on which phase of education they are working in. At primary school level, the ability to support catch-up (in literacy or numeracy) is the highest priority, followed by tutoring experience. At secondary school level, experience and having a degree in the subject the tutor is supporting is particularly valued. Catch-up is also a bigger priority in schools serving disadvantaged intakes whereas degree-level qualifications and the ability to recruit directly are a greater priority in schools serving more affluent communities (Teacher Tapp, 2020a).

When thinking about what you would look for in a tutor, please select the *three* most important aspects from this list

*(Teacher Tapp, July 2020)*

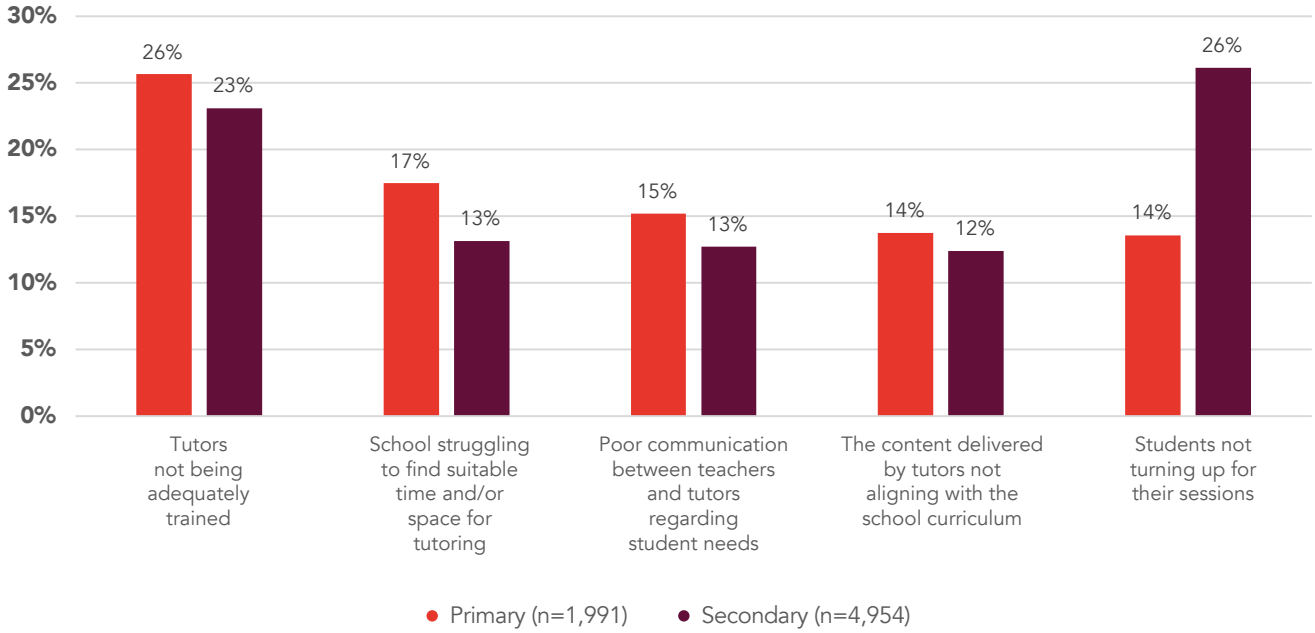


Teachers are conscious of a number of potential barriers to success which could stymie the National Tutoring Programme. In both primary and secondary phases, lack of training is teachers' chief concern.




Which do you feel is the *most* significant risk that could derail efforts by the National Tutoring Programme to raise the attainment of disadvantaged students?

*(Teacher Tapp, February 2021)*




This is a particular concern in schools serving more disadvantaged pupils (cited by 28% of teachers in the most disadvantaged schools compared with 23% of teachers in the most affluent schools). Meanwhile pupils not turning up to sessions is a critical concern at secondary school level but less of a concern at primary school level where time and space are more important concerns (Teacher Tapp, 2021).

The concerns and priorities highlighted by teachers in Teacher Tapp surveys echo a number of factors which previous research suggests influence the effectiveness of tutoring. Given that the level of impact that tutoring has varies quite considerably (Education Endowment Foundation, 2021b), it is important to take into account evidence on what might work best when designing or selecting interventions.

## The importance of tutor training, experience and skills

As noted above, around a quarter of teachers told Teacher Tapp that their biggest concern for the National Tutoring Programme was that tutors would not be adequately trained. This is understandable given that some studies argue that the benefits of tutoring accrue not only as a result of the additional instruction time, but also because of the quality of the instruction (Wasik & Slavin, 1993).

Wasik and Slavin argue that tutoring is most impactful when provided by teachers (Wasik & Slavin, 1993). However, their analysis is mainly based on studies of reading interventions. Meanwhile in a blog, Slavin (2018) argues that effective tutors do not need to be fully trained teachers and, in their 2000 meta-analysis (once again focused on reading), Elbaum et al. (2000) find that the greatest impact comes from tutoring by college students. One of the two maths-specific interventions included in the EEF's meta-analysis of tutoring (Education Endowment Foundation, 2021b) highlights the fact that head teachers valued tutors being experienced teachers (Torgerson et al., 2011). However in the second study, the intervention was delivered by teaching assistants (Rutt et al., 2014).

Evidence is therefore inconclusive regarding the optimal level of training and the qualifications that tutors should hold.

Tutors' skill in forming strong relationships with learners is crucial. According to the EEF's recent online tutoring pilot, strong tutor–pupil relationships encouraged learners to engage with tuition, and when tutoring programmes included a 'getting to know you' session, this helped tutors learn about their tutees' interests so they could adapt their sessions accordingly and build rapport. The pilot evaluation report suggests that this helped to drive pupil motivation.

> "Providers noted the importance of giving tutors 'permission' to spend more time on building rapport with learners."
>
> **Marshall et al., 2021**

## Intervention structure

The EEF argues that where tutoring is not delivered by trained and qualified teachers, it is advisable for tutors to follow a structured programme (Education Endowment Foundation, 2021b). Ireson (2004) also argues that the content and structure of a tutoring programme are important determinants of impact and Shanahan argues that:

> "In establishing tutoring programs, care must be taken to ensure adequate time on task for students, high quality of instruction, and appropriateness of curriculum. Otherwise, tutoring can actually lead to lower rather than higher achievement."
>
> **Shanahan, 1998**

However, these findings are largely based on reading interventions and the evidence being drawn on often relates to the 'model of reading' that underpins the tutoring (Wasik & Slavin, 1993) – for example, whether or not a programme uses phonics-based instruction (Elbaum et al., 2000).

In contrast, a Randomised Control Trial evaluation of a maths-specific structured tutoring intervention called Catch Up® Numeracy found that pupils who participated in the intervention made no more progress than those who received alternative one-to-one support from a teaching assistant. The authors therefore conclude that "the effect is likely to be a result of regular and sustained one to one teaching" rather than the fact that tutoring followed a particular structured programme (Rutt et al., 2014). Of course, this might mean that the specific programme's structure was ineffective, rather than meaning that structure does not matter in general.

In contrast to the findings from the Catch Up® Numeracy evaluation, Torgerson et al. (2011) suggest that an important feature of the Every Child Counts programme was that tutoring deployed a structured, diagnostic approach. Meanwhile frequent repetition caused frustration for pupils during trials of Third Space Learning's initial model, which suggests that problems with programme structure can undermine impact (Torgerson et al., 2016).

Although the evidence regarding the importance of programme structure in maths tutoring is inconclusive, structure certainly seems intuitively important and evidence regarding the need for careful curriculum sequencing (Ofsted, 2021) and interleaved practice (Rohrer et al., 2015) lends credence to this intuition.

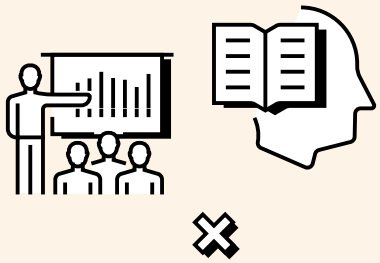
## Curriculum links

The intervention that achieved the highest impact in Wasik and Slavin's meta-analysis of (reading-focused) tutoring programmes was the one that had the greatest degree of integration with regular classroom instruction (Wasik & Slavin, 1993). Wasik and Slavin therefore suggest that creating consistency between the methods used in the classroom and those used in tutoring is of particular importance, and the EEF concludes that "tuition should be additional to, but explicitly linked with, normal teaching" (Education Endowment Foundation, 2021b).

## One-to-one versus small-group tuition

Another dimension of tutoring intensity is whether it takes place on a one-to-one or small-group basis. The EEF's view is that one-to-one tutoring has more impact than small-group tutoring but that because traditional one-to-one tutoring is considerably more expensive than small-group tutoring, a cost–benefit calculation favours small-group tutoring. On the other hand, the EEF's recent evaluation of online tutoring programmes found that four fifths (79%) of learners who had received one-to-one tuition liked being the only learner in their sessions (Marshall et al., 2021). The study goes on to note that:

> "The one-to-one format helped the majority of learners to focus and enabled the tuition to be closely tailored to their learning needs. Teachers and tutors felt the format worked particularly well for less confident learners and learners with special educational needs."




The above raises the question of whether, if issues with cost and scale could be resolved, one-to-one tutoring might then be preferable. However, a 2011 evaluation of Every Child Counts found that the programme had a positive impact when delivered on a one-to-one basis or with groups of two or three, with all group sizes making similar amounts of progress. The authors note a mix of advantages and disadvantages in relation to small groups. These all need to be taken into account when deciding which option to pursue.

*(Torgerson et al., 2011)*

| Advantages of small-group tuition | Disadvantages of small-group tuition |
|---|---|
| Opportunities for peers to reinforce each other's learning | More challenging to manage distractions and keep pupils on task |
| Pupils support each other | Harder to differentiate/ tailor to pupils' starting points |
| Pupils learn from each other's misconceptions | Pupils relying on help from others |
| | Group dynamics/ tensions between pupils |
| | Logistical challenges with the organisation and management of sessions |

# Practicalities

## Equity of access

Traditional models of tutoring (where parents are the main 'commissioners' or buyers) have historically resulted in uptake being highly skewed towards children from more affluent and educated households.

Data from the 2015 Programme for International Student Assessment (PISA) survey shows that for pupils with the same levels of achievement, well-off pupils receive 2.5 hours more additional instruction than their less well-off peers (Jerrim, 2017). Jerrim equates more affluent parents' tendency to buy a positional educational advantage via tutoring to *"a 'glass floor' for children in danger of low achievement"* – in other words, it provides families with a way of using their financial advantage to protect their children against downward social mobility or underachievement. Jerrim goes on to note that inequality in access to tutoring is particularly marked in science and maths.

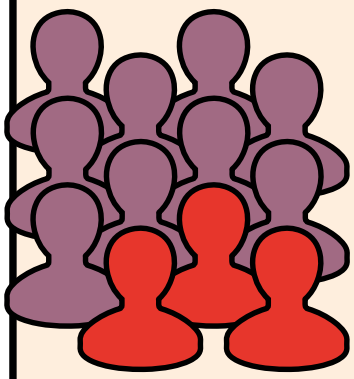
Ireson and Rushworth also find considerable inequalities in access to tutoring and show that these are linked to parental education levels:

> "The overall percentage of students with tutors was 39% if fathers had been to university, 24% if fathers had vocational qualifications and 21% if fathers had only school education... The disparity was greatest in year 11 where 43% of students had received tutoring if their father had a university education, compared to 19% if fathers had only a school education."
>
> **Ireson & Rushforth, 2009**

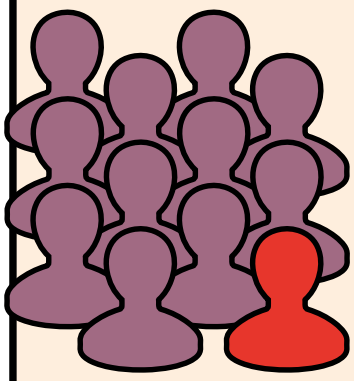
Polling of over 2,600 11- to 16-year-olds by Ipsos MORI (Jerrim, 2017) reveals additional disparities linked to:

- **geography:** pupils in London are more likely to be tutored;
- **ethnicity:** minority ethnic pupils are much more likely to be tutored;
- **family configuration:** pupils from two-parent households are more likely to be tutored.

**Year 11 pupils receiving one-to-one tuition in science or maths**



**3 in 12**
**low-achieving pupils from advantaged backgrounds**



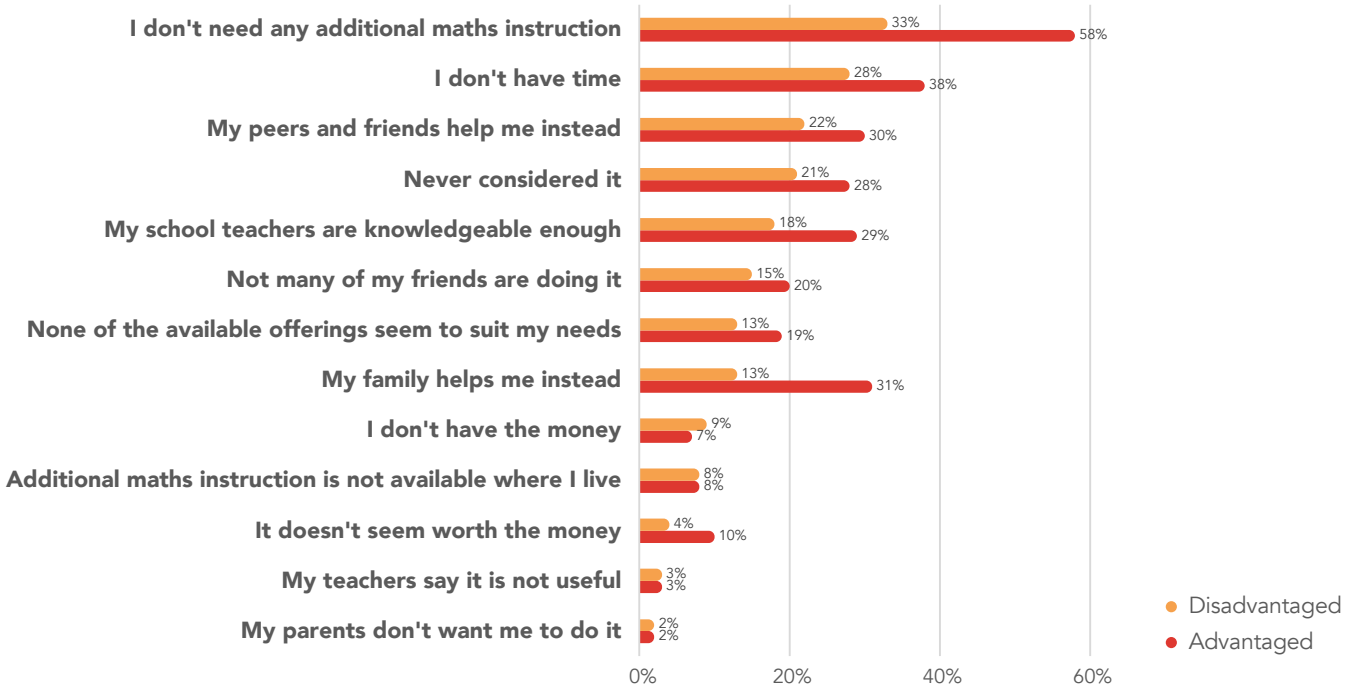
**1 in 12**
**low-achieving pupils from advantaged backgrounds**

Geographical disparities are also reflected in polling by Parent Ping, regarding how parents planned to respond to pandemic-driven learning disruption. Parents in London were twice as likely to have considered tutoring as a response to school closures compared with parents in other regions such as the North East, the West Midlands and Yorkshire and the Humber (Parent Ping, 2021). These geographical trends are likely to reflect disparities in parental attitudes to education, with high levels of uptake in London and among minority ethnic pupils being interconnected, since minority ethnic families tend to have particularly pro-educational attitudes. These families are in turn concentrated in the capital given its ethnic composition (Burgess, 2014; Ross et al., 2020).

A range of other factors also play a role in driving inequalities in access to tutoring. Ireson & Rushforth (2014) highlight the role of cost, stating that over half of their respondents said private tuition was too expensive. On the other hand, Jerrim finds that Year 11 pupils do not tend to give cost as a reason for not accessing maths tuition. Instead, he notes that pupils from affluent backgrounds offer more reasons for not receiving tutoring. He speculates that this may be because, for disadvantaged pupils, tutoring "may not even be on their radar" and that this results in them being "less able to provide concrete explanations as to why they do not receive any" (Jerrim, 2017).

Reasons stated by Year 11 pupils for not accessing Maths tuition

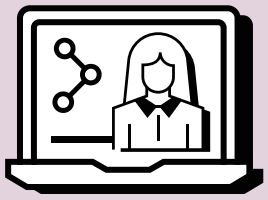
*(Jerrim, 2017)*




# Technology and online tutoring

The EEF's recent pilot of online tutoring found that students were split in their preferences regarding face-to-face or online delivery (Marshall et al., 2021). Just over a third said they preferred online tutoring and just under two thirds reported a preference for face-to-face delivery.

**36%**
**of pupils preferred online tutoring**



**64%**
**of pupils preferred face to face**

Building rapport online was a particular challenge and this is significant given the importance of relationships noted above. On the other hand, there were a number of benefits to online delivery in that it was more flexible and easier to rearrange sessions if a learner had to cancel or did not attend. This links to questions of attendance, explored in further depth below.

The quality of the technical infrastructure available for tutoring is likely to be an important determinant of success when tutoring takes place online. Bandwidth and access to a camera are particularly important. For example, the EEF's evaluation of an early iteration of Third Space Learning's model noted that tutors sometimes interrupted pupils because they did not know whether or not they were still working on a task (Torgerson et al., 2016). The evaluation therefore suggested that using a camera would be helpful to avoid this. However, since then, the decision has been made to focus on training tutors to pause, give pupils time and avoid interrupting rather than introducing the use of cameras as there remains too great a risk that video based instruction would cause problems with bandwidth and equipment.

"The biggest barrier to a smooth implementation of the online sessions was technology problems. As one teacher said, 'online it's only ever as good as your connection and your equipment'."

**Torgerson et al., 2016**

Improvements to technology in recent years are likely to have reduced some of the difficulties with online tutoring but lack of access to equipment and unreliable internet connections still act as barriers to effective delivery. Half (48%) of schools in the EEF's recent pilot of online tutoring reported that lack of equipment was a challenge and, although this may be less of an issue when tutoring takes place in school, a number of pilot participants reported problems with old computers, firewalls or connectivity even within the school environment. This fed through to pupils' experiences, with 19% of school-based learners reporting that poor internet had been a problem, something which caused considerable frustration and diminished benefits. The authors of the pilot evaluation therefore recommend that providers should conduct a 'tech audit' before beginning delivery (Marshall et al., 2021).

**Pupils who did not report internet/ connectivity issues**

**56%** enjoyed their online sessions "a lot"

**33%** enjoy learning more as a result of the tutoring

**Pupils who reported internet/ connectivity issues**

**46%** enjoyed their online sessions "a lot"

**27%** enjoy learning more as a result of the tutoring

## Attendance

Attendance at tutoring sessions is a key concern for teachers at secondary level (cited by 26% of teachers) but is less of a concern for those working in primary schools (cited by 14% of teachers) (Teacher Tapp, 2021). Although holding sessions during the school day can make it easier to ensure pupils attend, Shanahan (1998) notes that this can lead to pupils missing out on expert tuition from a qualified teacher when they are taken out of normal lessons, sometimes to work with a less qualified instructor.

The EEF notes that where tutoring programmes are preceded by sessions for parents or carers this can help secure buy-in and improve pupil attendance and engagement (Marshall et al., 2021).

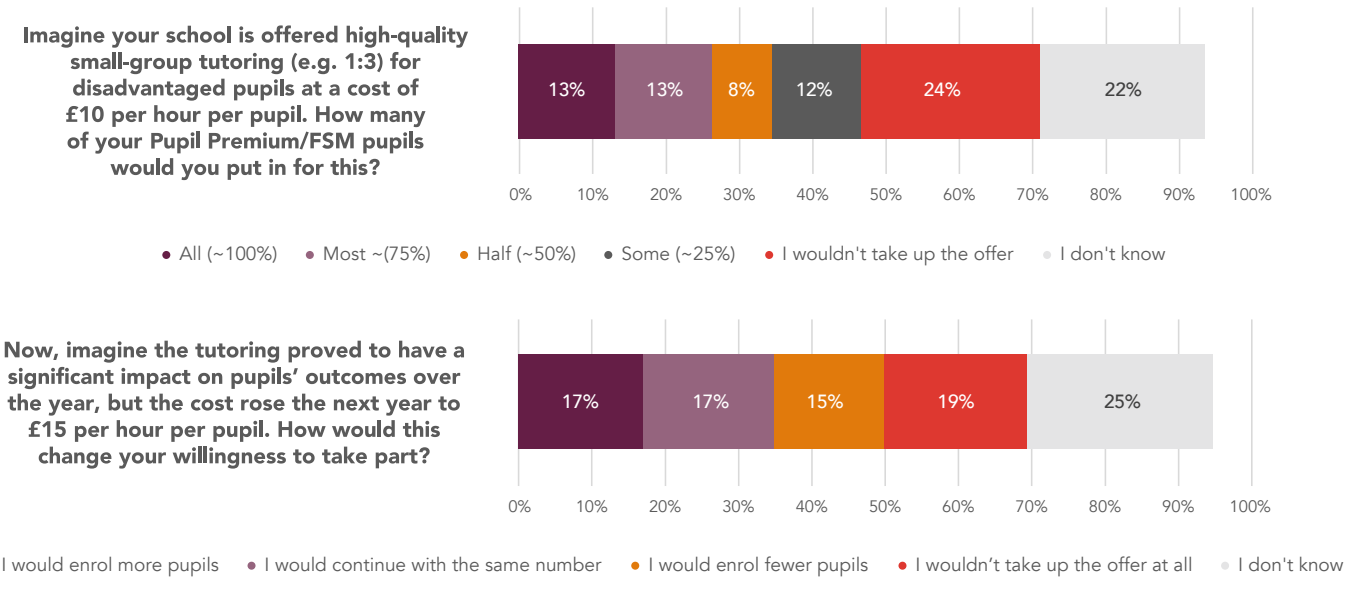
# Affordability

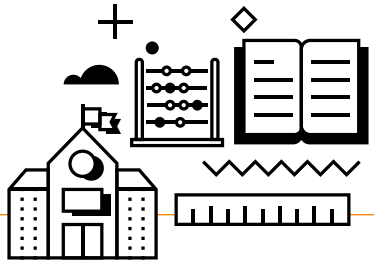
The EEF calculates a median price of £700 per pupil for one-to-one tutoring programmes based on 30 minutes, five times a week, for 12 weeks (i.e. 30 hours of provision). It is on this basis that it considers one-to-one tutoring an expensive approach. However, the price of the programmes it reviews varies quite considerably, ranging from £112 per pupil for 'TextNow', to £2,600 per pupil for Every Child a Reader (Education Endowment Foundation, 2021a). Meanwhile, Catch Up® Numeracy – one of the two maths-focused tutoring programmes – costs £130 per pupil for a 30-week programme involving two 15-minute sessions per week i.e. 15 hours of tutoring, which is equivalent to £260 for 30 hours (Rutt et al., 2014). There are therefore clear overlaps with the price bracket for certain paired or small-group interventions given that the stated costs for these is £350 per pupil for two pupils receiving 30 minutes of tuition, 5 times a week for 12 weeks (30 hours), or £233 if tuition takes place in groups of three pupils (Education Endowment Foundation, 2021c).

Recent polling of school leaders by Teacher Tapp gives a mixed picture on schools' price sensitivity, with considerable variation in attitudes to cost[3]. A third of school leaders would be willing to enrol at least half of their pupils who are eligible for the Pupil Premium on a tutoring programme costing £10 per hour (equivalent to £300 for a 30-hour programme). This was as much the case in schools serving large numbers of learners who are eligible for the Pupil Premium (where this would constitute a larger number of participants) as it was in schools where fewer pupils would be eligible. Meanwhile for a third of school leaders, a £5 per hour change in price (bringing the cost to £450 for a 30-hour programme) would not reduce their willingness to pay – so long as evidence of impact was strong. For a similar proportion of leaders this change in price would reduce their willingness to enrol pupils (Teacher Tapp, 2020b, 2020c).

Leaders of more disadvantaged schools were more price sensitive than their peers in more affluent schools and primary school leaders were more price sensitive than those working in secondary schools.

Teacher Tapp, August 2020
(n=1,661)

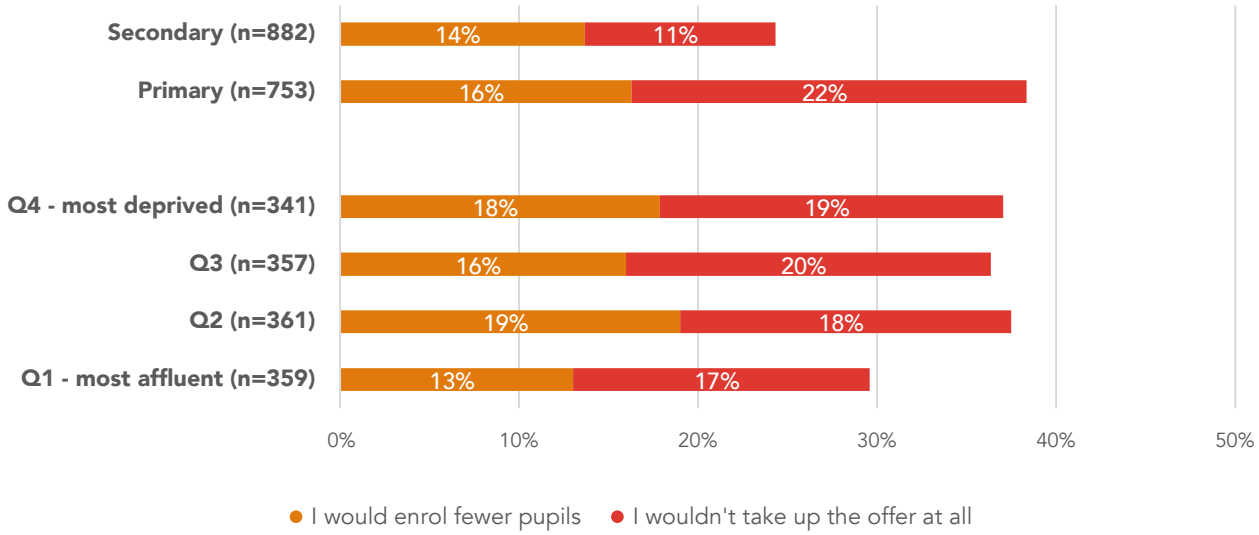


[3] It is important to note that questions focused on small-group tuition rather than one-to-one tuition.

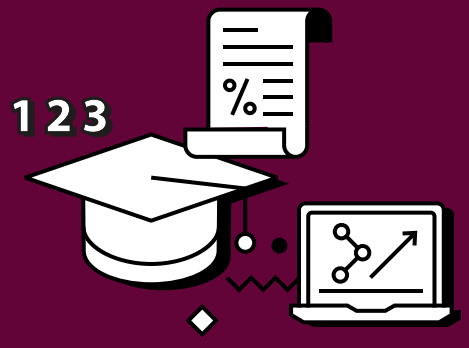
Now, imagine the tutoring proved to have significant impact on pupils' outcomes over the year, but the cost rose the next year to £15 per hour per pupil. How would this change your willingness to take part?

*(Teacher Tapp, August 2020)*




## Conclusions

- In the past, access to tutoring has tended to be inequitable. Socioeconomically advantaged and minority ethnic pupils, as well as those living in London, have all been more likely to access tutoring than their peers. We are now at a point in time where there is an opportunity to change this and make access fairer.
- Teachers want tutors to be well trained, and quality of instruction is likely to play a role in determining tutoring's effectiveness. However, evidence is mixed regarding exactly what level of experience and qualifications tutors need to have.
- Previous meta-analyses have emphasised the importance of structured interventions, but findings from studies are not consistent on this point, despite it seeming intuitively reasonable and this aligning with wider evidence on curriculum and pedagogy. The frequency and intensity of tutoring may also influence effectiveness and smooth links between tutoring and normal classroom practice appear to be beneficial.
- Small-group tutoring is sometimes argued to be a more cost-effective alternative to one-to-one tutoring but costs of both modes of delivery in fact vary considerably from programme to programme and this shifts the equation, making it impossible to draw blanket conclusions about value for money. Moreover, there is mixed evidence regarding the relative merits of both approaches and studies highlight a number of advantages and disadvantages to each.
- Technological changes and school disruption have strengthened the case for online tutoring but at the moment pupils are divided in terms of which they prefer. A majority still favour face-to-face tutoring and even when online tutoring happens in school, technological hurdles can hamper delivery.



# Solution Requirements 7

This evidence review has identified four main requirements that maths tutoring solutions will need to meet if they are to address the pandemic's profound impact on maths learning, particularly for disadvantaged pupils.

## 1. Tutoring solutions need to scale up rapidly

There is an urgent need to provide additional maths support to pupils if the educational, social and economic consequences of learning loss in the subject are to be avoided. Support needs to be targeted at the disadvantaged pupils who have suffered most from learning loss and who have traditionally had less access to tutoring. However, although the government has pledged to provide 90 million hours of tutoring, and although tutoring is popular with both parents and teachers, supply is far from sufficient to meet demand.

Tutoring providers therefore need to roll out rapidly scalable models that can meet the unprecedented scale of demand.

## 2. Tutoring solutions should tackle the particular challenges pupils face in maths

Poor confidence and anxiety linked to maths at primary school can have particularly serious consequences for long-term achievement in the subject.

Tutoring programmes should therefore help pupils feel more confident in maths and providers should explore whether they can help pupils in the early stages of Key Stage 2 to build the foundational skills they need to avoid the onset of maths anxiety and so that they can go on to succeed in the future.

## 3. Tutoring solutions need to build on the best available evidence regarding how to maximise impact

Research points to a number of 'best bets' for how to maximise the impact of tutoring. While more research, particularly focusing on Maths tutoring is urgently needed, tutoring providers need to ensure their models draw on the best available evidence.

Providers should therefore employ highly skilled and trained tutors and help them to deploy effective pedagogy while building good rapport with their tutees. Tutoring programmes should be carefully designed and linked to the curriculum.

## 4. Tutoring solutions need to address practical constraints that can hamper effective implementation

Inequitable access, difficulties with technology, poor attendance and high costs can all stand in the way of delivery.

Tutoring providers therefore need to design scalable and effective solutions that are equitable, glitch-free, well-attended and affordable.

# Introducing Third Space Learning's Solution

8

Third Space Learning (TSL) was established in 2013 to help tackle the maths attainment gap by providing online one-to-one maths tuition to pupils in English state schools.

Since launch, Third Space Learning has delivered over one million one-to-one tutor sessions to more than 90,000 pupils, of whom 45% were eligible for Pupil Premium. Of these, 195,780 sessions have been provided through the National Tutoring Programme following Third Space Learning's selection as a tutoring partner in year 1.

Third Space Learning recruits and trains specialist maths tutors in South Asia due to the region's large and highly educated workforce which includes a high proportion of STEM (science, technology, engineering and maths) graduates. Third Space Learning has sought to tap into this talent base by building operations in India and Sri Lanka to recruit, train and develop a maths tutor workforce.

This model allows Third Space Learning to deliver specialist maths tuition at a large scale and at an affordable price, 18% below the government's current 'value for money benchmark' (National Tutoring Programme, 2021b).

The company delivers tuition at primary and secondary level but the majority of its programmes are for primary school pupils, particularly years 5 and 6.

Programmes are delivered in school as part of the school timetable and are designed to supplement class teaching. Teachers select which pupils receive the tuition and what they would like the tutors to focus on. Pupils undertake a diagnostic assessment on TSL's platform to identify learning gaps and a personalised lesson programme is created for their weekly sessions based on this.

Sessions take place in TSL's purpose-built 'virtual classroom' which includes audio for one-to-one discussion, a range of interactive tools and lesson plans to support the tuition.

**Lessons are structured in 3 parts using a mastery approach:**

1. Teaching
2. Guided and 'scaffolded' practice
3. Application – providing an opportunity for deeper learning.

Teachers are provided with weekly and termly progress reports and sessions are recorded for safeguarding and to feed into monitoring and development. The quality of tuition is overseen by former UK maths teachers and tutor training focuses heavily on modules for growth mindset and 'student-centred' learning.

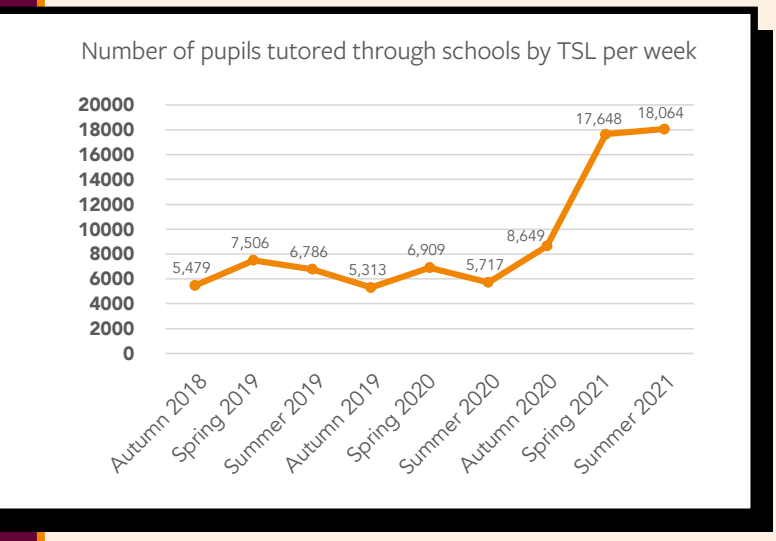
We now go on to review how TSL's model meets the requirements set out in section 7. Alongside a range of metrics collected by Third Space Learning the review includes thematic analysis 132 comments submitted to Third Space Learning, 125 of these came from teachers and school leaders and three came from parents. The comments set out what the respondents valued about the service but it should be noted that they were not systematically collected and the analysis is therefore intended to provide additional insight into pertinent and valued features of the model rather than firm or representative conclusions.

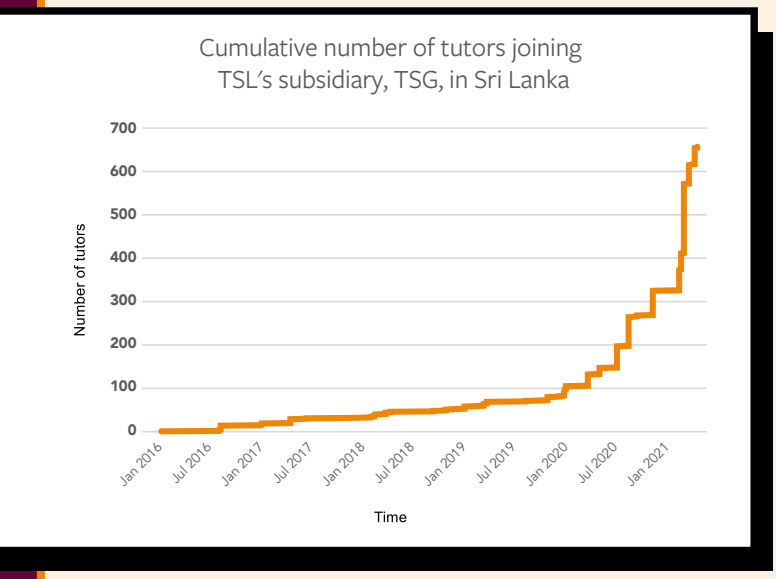
# Third Space Learning's ability to meet the requirements

## 1. Tutoring solutions need to scale up rapidly

### Track record

By drawing on an international pool of tutors, Third Space Learning has been able to scale up much more quickly in response to the pandemic than would otherwise have been possible. Indeed, the number of pupils Third Space Learning tutored more than tripled between summer 2020 and summer 2021, rising to nearly 20,000 pupils in summer 2021.




### Future potential

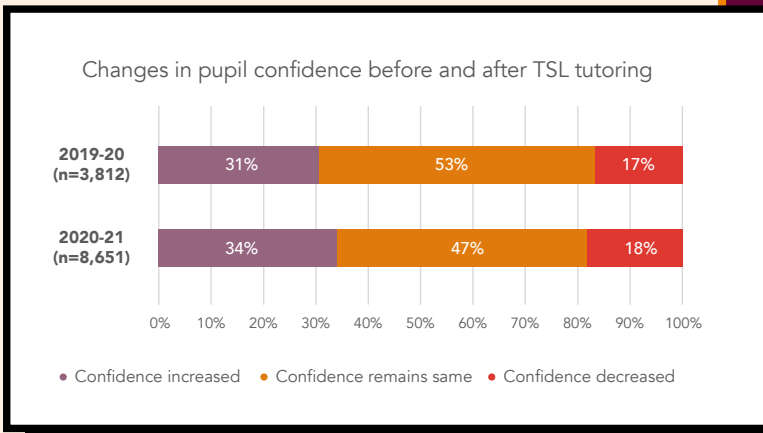
Third Space Learning still has the potential to scale up at an unusually rapid pace by drawing on an international pool of potential tutors and deploying its existing technological and training infrastructure.

Third Space Learning recruits and trains tutors in countries where a large proportion of the workforce has completed advanced education but unemployment is high. For example, in Sri Lanka 83% of the workforce have completed advanced education (World Bank, 2021) and 4% have a Bachelor's degree or equivalent (World Bank, 2020), yet the unemployment rate for those with tertiary education is more than double that of the UK (Gupta & Abouaziza, 2021). The space for growth is clear from the fact that Third Space Learning received around 13,844 applicants for about 513 online tutor vacancies between January and May 2021 (Gupta & Abouaziza, 2021). In other words, only 3.7% of applicants were eventually selected.

Third Space Learning's model, involving online sessions delivered through headsets also avoids some of the logistical challenges that schools face when attempting to find the space and time to run large numbers of in-person, one-to-one or small group sessions in parallel. This is something that schools specifically highlight in their feedback on the programme:

> "This provides the opportunity for a large number of children to engage in bespoke maths tuition at the same time and the personalised objectives mean that everyone is working at the right level..."
>
> **Maths Lead**

> "...we could get eleven children having 1-to-1 within an hour..."
>
> **Primary School Assistant Principal, Doncaster**

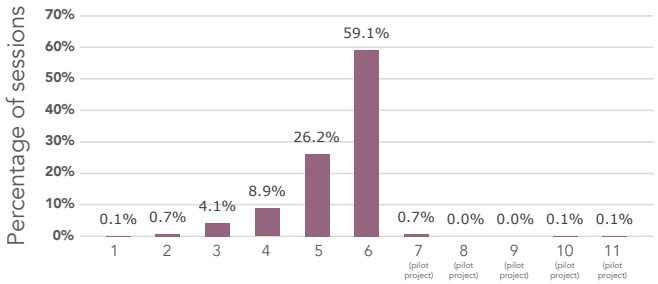


## 2. Tutoring solutions should tackle the particular challenges pupils face in maths

### Age group

Third Space Learning focuses specifically on maths tutoring at primary school. This is important given that maths tutoring has historically focused on secondary schools despite this being too late for many pupils.

Proportion of sessions in 2019/20-2020/21 by year group (n=359,841 sessions)




On the other hand, Third Space Learning should now develop its offer for younger pupils and encourage schools to target pupils in early Key Stage 2. This is important in responding to evidence showing that early underachievement is compounded over time and research suggesting that Year 3 can be a turning point (Supekar et al., 2015).

### Confidence and maths anxiety

Third Space Learning has a particular focus on confidence, which is critical given the challenges pupils face around maths anxiety.

**92%**

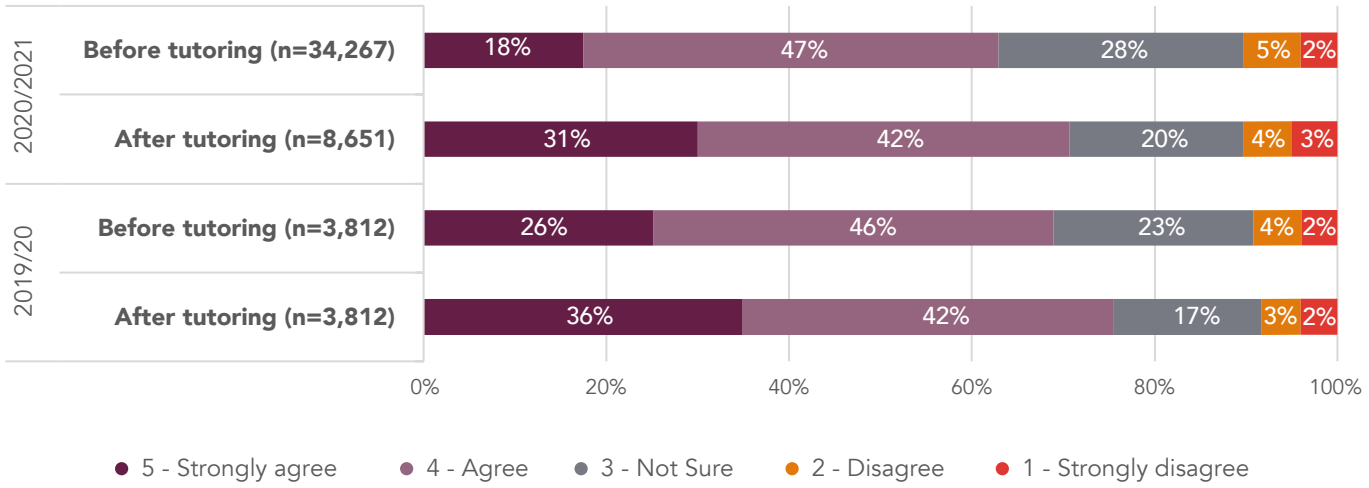
**of teachers say that Third Space Learning's 1-to-1 lessons were effective preparation for target pupils sitting SATs**

Teachers responding "yes to some extent" or "yes definitely" in 2018 and 2019 (n=130)

In order to nurture pupils' confidence, tutors are trained to work in pupils' zone of proximal development, encourage a growth mindset, provide adequate 'scaffolding' and plan opportunities for pupils to 'have a go' and to treat mistakes as an opportunity to learn.

Internal tracking data shows that the proportion of pupils who strongly agreed that they "feel confident in maths" almost doubled from the start to the end of the programme in 2020/21, from 18% to 31%, and increased from 26% to 36% in 2019/20. Pupils' average score on a five-point scale increased from 3.9 to 4.1 in 2019/20 and from 3.7 to 3.9 in 2020/21.

Pupil responses to the statement "I can do well in maths"



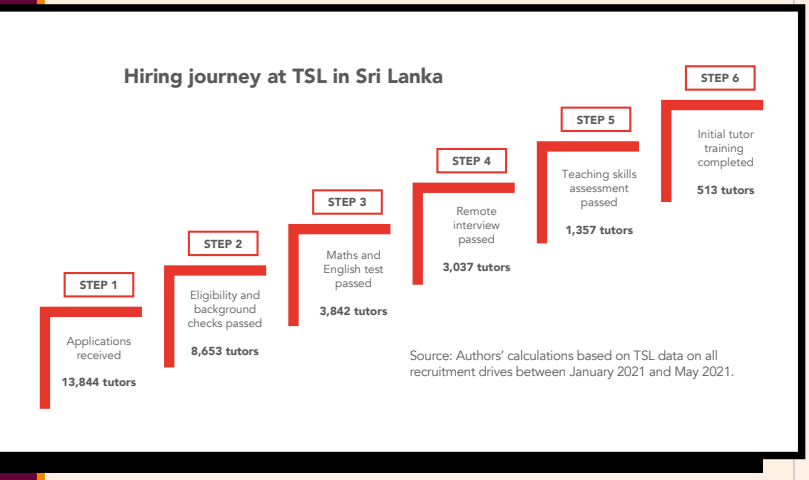
Improvements in pupils' enjoyment of and confidence in maths were a recurring theme in teachers' feedback regarding what they valued about Third Space Learning's service, with a third of teachers specifically choosing to highlight this in their feedback. Some comments suggested that the opportunity for less confident pupils to learn without being watched by their peers was of particular importance:

> "[We value] the opportunity for the children to apply skills in a safe environment where they are not afraid to fail in front of their peers. Very good for increasing confidence and this is demonstrated in class lessons where less able mathematicians are beginning to contribute more ideas."
>
> **Assistant Head**

## 3. Tutoring solutions need to build on the best available evidence regarding how to maximise impact

### Tutor training and skills

Third Space Learning selects tutors based on a range of criteria, alongside qualifications.




Recruitment and selection involves 6 stages and 46 hours of training. This time includes 3 hours of assessor-led practice demonstrations, 4.5 hours of peer demonstration lessons and 4 hours of lesson and demonstration discussions. According to analysis by Gupta & Abouaziza, 2021, only 3.7% of all applicants make it through to delivering sessions online.

Just under half (43%) of Third Space Learning's tutors hold a university degree or similar level of qualification (such as an accountancy qualification). Of these, around two-thirds (62%) hold STEM qualifications and a quarter (27%) have a maths-based degree or similar[4]. Many of those who have yet to achieve a university degree are currently working towards one and a desire to build a career in teaching is a common motivation among recruits, cited by 16% of tutors (Gupta & Abouaziza, 2021).

Once they begin delivery, tutors continue to receive training and regular assessments against four 'pillars', which they are rated against twice a term:

> "First, the familiarity pillar ensures that tutors are aware of the **policies and procedures** advocated at TSL [Third Space Learning]. The second is **subject knowledge** – the tutor's mathematical knowledge, and the ability to identify various approaches to teach a concept and to spot mistakes and misconceptions. Third, the **effective communication** pillar ensures that tutors deliver lessons with clear communication. Finally, **student-centred teaching** ensures tutors understand and identify the domains of a child's learning. Each tutor is rated on their performance on these four pillars twice per academic term."
>
> **Gupta & Abouaziza, 2021**

Where sessions do not meet quality cut-offs, tutors are expected to make improvements. They are reassessed and tutoring is discontinued if improvements have not been made. Tutors value the support and development they receive and rate the supervision, training, feedback and development that they receive highly (Gupta & Abouaziza, 2021). Third Space Learning's extensive quality assurance process may explain why, between 2018/19 and 2020/21, concerns about tutor quality only accounted for between zero and 1% of Third Space Learning's customer attrition and 85% of customers currently give Third Space Learning a satisfaction score of 7 or above out of ten.

[4] Figures provided by Third Space Learning based on tutor status in March 2021.

Feedback on Third Space Learning emphasises a number of factors that contribute to tutor quality. Around one in ten comments about Third Space Learning (including two of the three parents who submitted feedback) specifically highlighted tutors' skills and several emphasised tutors' knowledge.

> "Tutors seem to be engaging, knowledgeable and attentive to the needs of our pupils..."
>
> **Primary Senior Leadership Team/ Middle Leader, Suffolk**

> "We've been impressed by the range of questioning techniques that are used to keep the children engaged – the tutors gauge how the child is reacting to them during the lesson and adapt to them."
>
> **Primary School Special Educational Needs Coordinator (SENCO), Liverpool**

Schools particularly value tutors' personalised approach, with a quarter of comments mentioning this specifically. This is reinforced by comments in the 18 case studies Third Space Learning has collected, seven of which highlight personalised or individual learning.

**Relationships and rapport**

Relationships between tutors and learners are often highlighted as a strength, with a third of comments referring to pupils' enjoyment and engagement. These comments are particularly encouraging given previous research noted in section 6 which suggests that rapport and relationships play an important role in making tutoring effective.

> "Her tutor was really friendly and explained everything really clearly. She wanted another session today!"
>
> **Parent**

> "Excellent rapport with the pupils."
>
> **Class Teacher**

> "All of the children ... actually adore having that bond with the tutors..."
>
> **Deputy Headteacher, Bristol**

**Programme structure**

The EEF argues that tutoring interventions should involve "short, regular sessions (about 30 minutes, three to five times a week) over a set period of time (six to twelve weeks)" (Education Endowment Foundation, 2021b). Third Space Learning's tutoring programme involves 12-15 1-hour sessions and all of these take place on a one-to-one basis. The average learner on the platform attends a total of 11 sessions. Third Space Learning should now ensure that one off, or short programmes become the exception.

The organisation's model is structured around an initial needs assessment and the benefits of this assessment are a recurring theme in feedback, with a quarter of comments mentioning this.

> "Using the diagnostic programme – where lessons are automatically assigned each week based on each individual pupil's gaps – meant the lessons were far more personalised than if we were doing them for each pupil."
>
> **Primary Assistant Headteacher, Essex**

> "The assessment of their level of understanding which is then built upon with lots of positive reinforcement. 1:1 tailored programmes to the individual needs of the child is time very well spent."
>
> **Maths Lead**

**Links to classroom teaching**

Despite 14% of teachers polled by Teacher Tapp being concerned about a lack of alignment between classroom curriculum and tutoring, many teachers highlight the strong links Third Space Learning builds between tutoring and classroom teaching, with one in 10 comments making reference to this strength and 3 case study schools specifically highlighting this as a welcome characteristic:

> "It really helps when they're able to build on what they've learnt in class."
>
> **Primary School Special Educational Needs Coordinator (SENCO), Essex**

> "Third Space's lessons are very closely aligned with our curriculum, so we've been able to match them with what's being taught in class throughout the year."
>
> **Primary School Deputy Headteacher, Trafford**

Third Space Learning provides a range of resources on its hub and these can help build links between classroom and tutoring curricula. Around a quarter of respondents made reference to resources. These comments tended to particularly draw attention to the diagnostic tools provided on the hub, with teachers describing how they made use of these in their classroom teaching.

> "We use the Third Space Maths Hub Resources a lot. As a whole school, we use the Fluent in Five and Rapid Reasoning resources every day, because they're very manageable within the class and keep key maths skills a priority. Some of our teachers have also used the pre and post learning resources, which are great for identifying specific weaknesses in a topic area for a group."
>
> **Primary School Deputy Headteacher, Trafford**

Although the risk of poor communication with tutors was a stated concern regarding the National Tutoring Programme for 15% of primary teachers, 1 in 10 teachers who provided feedback to Third Space Learning chose to mention links with teachers as being a key strength. The weekly email on each pupil's progress appeared to be particularly valued:

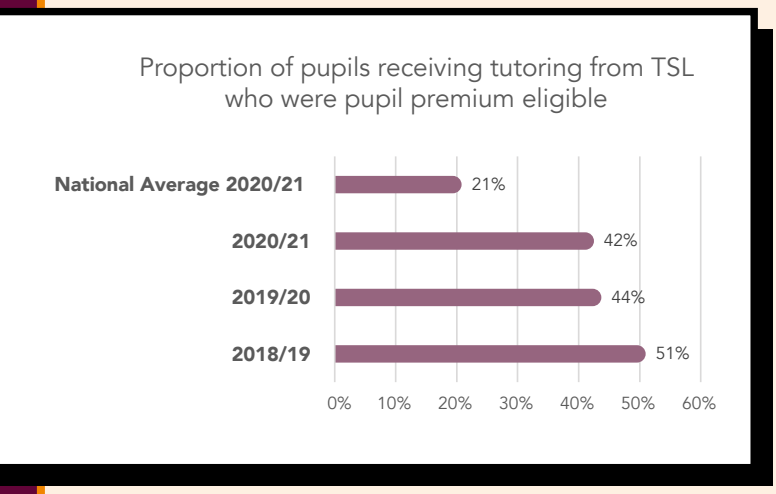
> "I like the way you send us an email each week to remind us to log on for the reports. The simple diagrams are good so you can see where they started at and where they've ended at. And then you dig down further and it tells you what they need to do more work on."
>
> **Primary School Special Educational Needs Coordinator (SENCO), Liverpool**

# 4. Tutoring solutions need to address practical constraints on implementation

### Equity

Third Space Learning plays a different role in the sector compared with traditional tutors, given that its sessions primarily take place in schools at teachers' instigation (rather than parents procuring it).

Because schools often make use of Pupil Premium or National Tutoring Programme funding to pay for the Third Space Learning programme, access is considerably less inequitable than traditional tutoring. This is likely to be the reason why the proportion of Third Space Learners who are eligible for the Pupil Premium is double the national average (42% as against 21%).




### Technology

Improvements to technology have been a priority for Third Space Learning since its 2016 evaluation (Torgerson et al., 2016). The organisation has rolled out a new platform that is intended to better suit younger pupils and it now provides schools with headsets. The fact that in 2020/21 only 5% of school attrition was due to problems with technology suggests that these changes may have been effective, particularly given that one in 10 comments from schools reference Third Space Learning's customer support, often emphasising how this helps overcome technical challenges:

> "You're always on the phone quite easily when I can't print something out or I can't do something – the technical help is very good!"
>
> **Primary School Special Educational Needs Coordinator (SENCO), Liverpool**

> "Any issues we may have had have been rectified incredibly quickly. It is great knowing that should we not know how to do something/set something up, then nine times out of ten your staff will be able to advise/fix it with a simple phone call. Accessing the lessons, particularly from home, is also fairly straightforward."
>
> **Primary School, Suffolk**

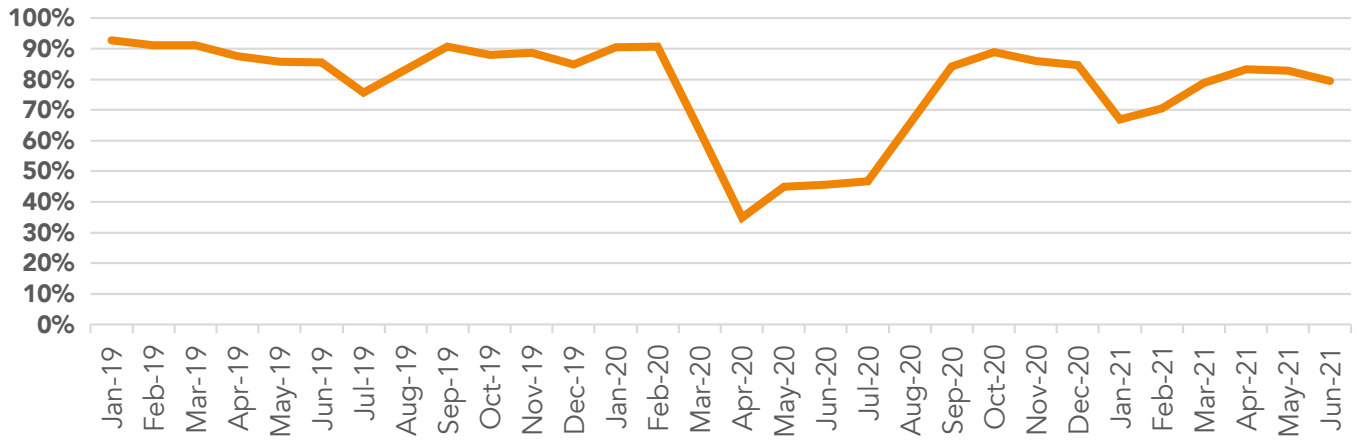
> "When we have problems e.g. headphones you are helpful in re-resourcing to ensure sessions are not missed."
>
> **Headteacher**

**Attendance**

Third Space Learning typically achieves an attendance rate of over 80% and pre-pandemic the figure was over 90%. Although, unsurprisingly, there were some dips during school closures, since the start of 2021 the rate has bounced back up to 79%.

Percentage of sessions attended

*Based on 692,190 sessions booked since January 2019*




**Cost**

The average price schools pay for a block of 12 one-to-one sessions with Third Space Learning is currently £213, which is the equivalent of £550 for 30 hours of tuition. This is 21% cheaper than the EEF's estimate of £700 as the median cost for 30 hours of one-to-one tuition (Education Endowment Foundation, 2021a). However it is 52% higher than the median figure given for paired tuition (Education Endowment Foundation, 2021c).

In 2021 the government published quality criteria for tutoring under the National Tutoring Programme and set a 'value for money benchmark' of £22.31 per hour, per pupil (National Tutoring Programme, 2021b). Third Space Learning is currently offering tutoring at a price that is 18% below this (£18.33).

Where Third Space Learning's customers mentioned costs in their comments this was generally in positive terms, although sometimes they were referring to value for money *despite* cost.

"One to one for a good value price..."

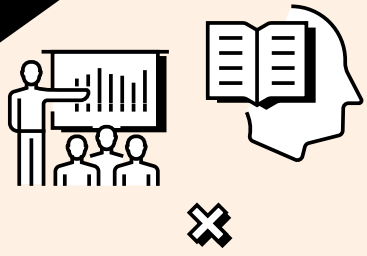
**Deputy Headteacher**

"Excellent resources and seems to be having a measurable impact. Not [rated] a 10 because it's very expensive."

**Middle Leader**

"Our intervention approach has been to use teachers to work with children for an hour after school, with us paying our teachers the hourly one-to-one tuition rate. Third Space Learning enabled us to pull back a little bit on that cost..."

**Assistant Head, Year 6 Teacher and Maths Coordinator, Lancashire**



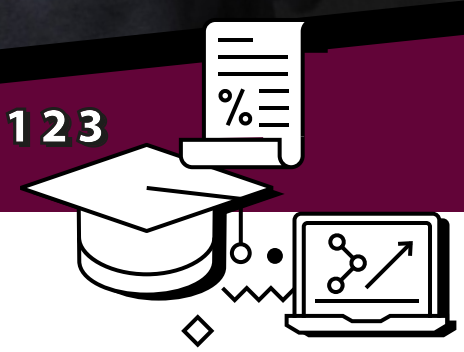
# Conclusion 9

Maths learning, particularly at primary school, will play a crucial role in pupils' ability to bounce back from the pandemic. Early achievement is more deterministic of long-term educational and economic outcomes in maths than it is in many other subjects, yet the pandemic has had a particularly corrosive impact on achievement in the subject. Unfortunately, disadvantaged pupils have borne the brunt of this.

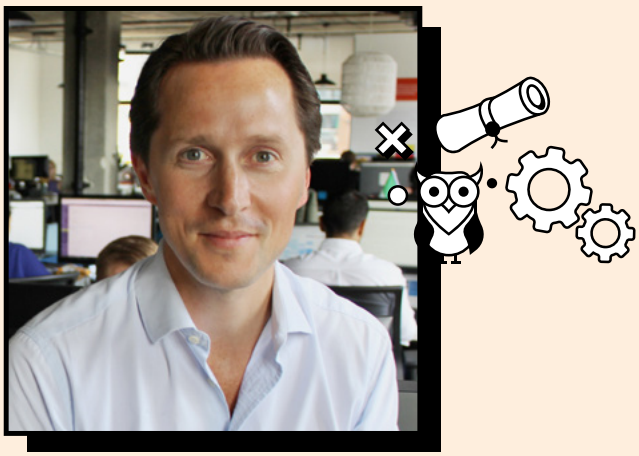
Maths tutoring in primary schools, particularly in early Key Stage 2, can help make up for lost time. Trials of tutoring have generally (although not always) yielded positive results. It is not yet clear to what extent conclusions drawn from studies of English (and reading in particular) transfer to maths but there is good reason to believe that the benefits of well-designed and well-delivered interventions have the potential to be even greater in maths than in other subjects.

In the past, tutoring has been criticised as a practice that entrenches privilege for those who can afford it. However, the landscape has shifted in recent years; schools now see tutoring as a valued tool in their arsenal when tackling educational disadvantage. The Covid-19 pandemic and government funding for the National Tutoring Programme have turbo-charged this shift, and many parents, teachers and the government recognise that tutoring has a vital role to play in the educational recovery from the pandemic.

Third Space Learning is a primary-school-focused, one-to-one maths tutoring programme that is highly scalable and which employs an intensively trained and selected pool of tutors who deliver a carefully structured intervention. It therefore provides a valuable solution to the challenges our pupils and education system are currently facing.



# Afterword 10



## Tom Hooper
Chief Executive,
Third Space Learning

Closing the attainment gap in maths is the driving force behind all that we do at Third Space Learning and why we partnered with CfEY to produce this report.

This report makes for deeply concerning reading. At Third Space Learning we are well aware of the themes, but it is the scale of the problem which is most sobering. It must provoke a determined and prolonged response from all of us involved in supporting children's learning.

Poor maths skills have long term social and economic consequences and act as a barrier to social mobility. The report clearly proves that we must invest more in maths at Primary level. If we do not provide more support, in an equitable manner, at Primary level, we will not improve results at GCSE, nor solve the STEM skills crises our society and economy face. We welcome this recognition and strongly support the conclusion.

Third Space Learning has been designed around the pedagogical principles that the report highlights, notably in terms of high-quality tutor training and aligning programme design with class teaching. Of particular importance is our tutor training's focus on growth mindset and student rapport. We believe this plays an important part in our track record of success in increasing pupils' maths confidence and tackling the maths anxiety that "A Space for Maths" highlights.

However, we know that it is critical that we focus on researching the requirements for operational success. Genuine impact, at a national level, is what we must care about. This will only occur if we can find good solutions that can be delivered to hundreds of thousands of pupils at a price that schools, or the DfE, can afford. This has always been our passion.

The report clearly identifies how important cost is if we are to reach large numbers of disadvantaged pupils. The DfE has said that a national tutoring solution must cost less than £22.31 per hour per pupil. Third Space Learning is the only provider in the first year of the National Tutoring Programme that can deliver one-to-one tuition at less than this price. The reason we can do this is because we built Third Space from the bottom up precisely to be able to deliver specialist one-to-one maths tuition, affordably and directed by teachers as a part of their school intervention strategies.

In addition to affordability, there is the critical challenge of ensuring we have a significant supply of high quality tutors to deliver sessions. Our global model of tutor recruitment and extensive tutor training means we can scale at a rapid pace without sacrificing tutor quality. It also means we are not calling on teachers and teaching assistants in England to do even more. Instead our tutors complement what teachers do in the classroom rather than adding to their workload.

Our focus on quality maths tuition at high scale and low cost is now well established in England. We have delivered over 1 million sessions to more than 90,000 pupils in nearly 3,000 Primary schools, of whom 45% are eligible for Pupil Premium. The opportunity that our global tutor model presents is well proven, and popular with teachers across the country. Whilst Third Space's model is just one option, we would urge policy makers to embrace solutions such as ours that can help solve the true size of the maths attainment gap.

CfEY's findings require energetic and rapid innovation if we're to create a permanent solution to close the maths attainment gap for good. We are keen to act quickly, not least because the longer we wait the larger the educational, social and economic consequences will be.

# Appendix: Summary of key studies of maths tutoring

11

Of the 16 studies included in the EEF's Teaching and Learning Toolkit entry on one-to-one tutoring (Education Endowment Foundation, 2021b), only four include tutoring in maths/numeracy and we summarise them here.

**Programme evaluations**

### Catch Up® Numeracy (Rutt et al., 2014)

This Randomised Control Trial concluded that the Catch Up® Numeracy intervention had an effect size of 0.21 but that this was broadly similar to (or slightly less than) impact in a comparison group in which pupils had spent equivalent time receiving one-to-one support from a teaching assistant but without the deployment of the same structured programme. This suggests that it was one-to-one time, rather than the specific intervention, that delivered the benefits. A follow-up study (Hodgen et al., 2019) also compared pupils receiving the Catch Up® Numeracy intervention to another group receiving one-to-one support from teaching assistants but without the structured programme, but did not find that the intervention delivered additional learning compared to the group not receiving this intervention.

### Every Child Counts (Torgerson et al., 2011)

This Randomised Control Trial concluded that a one-to-one intervention targeting 6-year-olds had an effect size of 0.33 and that it also had benefits for pupils' confidence in maths. The trial also compared the one-to-one intervention with an adapted intervention delivered to pairs of pupils, finding similar effects. The study authors could therefore not reach a conclusion on which was more effective. A smaller-scale comparison to a group of pupils taught in triplets was run and no evidence was found to show that one mode of delivery was more effective than another (but sample sizes here were small). Headteachers considered recruitment and retention of the required specialist teachers a key barrier to the interventions' sustainability.

**Meta-analyses**

### Tutoring: By adults, one-on-one, structured Pre-K to 12 Education (Washington State Institute for Public Policy, 2019b)

This estimated the impact on attainment and cost benefits of a series of interventions delivered at the age of 6, most of which, were reading focused but some of which covered Maths. It concluded that the interventions had an effect size on test scores of 0.24.

### Tutoring: By adults, one-on-one, non-structured (Washington State Institute for Public Policy, 2019a)

This study is similar to the one above. On average, programmes involved 35 hours of tutoring time over 9 months and the tutors were primarily "paraeducators" (teaching assistants) and community volunteers who had received approximately 3 hours of training. The treatment age was 11 and the study found a much smaller effect size of 0.03 on test scores.

The balance between reading- and maths-focused interventions included in these two studies is hard to discern and there is very little detail available regarding methods and inclusion criteria. Both studies reference tutors exercising "discretion when selecting and implementing tutoring strategies," making comparison difficult.

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