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Networks of Headteachers and Schools

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November 2024

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Acknowledgements

This publication includes analysis of the National Pupil Database (NPD). The Department for Education is responsible for the collation and management of the NPD and is the Data Controller of NPD data. Any inferences or conclusions derived from the NPD in this publication are the responsibility of the Education Policy Institute and not the Department for Education.

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Executive summary

Headteachers largely learn their skills on the job from those around them. Great headteachers are likely to learn from other outstanding leaders who they work with through their careers. However, leaders risk becoming isolated when they remain in a single school and do not benefit from exposure to new environments and people. In this report we examine the movements of senior school leaders – those who will reach headship – between schools. We map the connections between those leaders who work together to highlight where there are risks of isolation and where active information sharing might help support schools and leaders.

To identify the networks of senior leaders, we follow the movements of all teachers who became heads between 2010 and 2019. Using those movements, we identify the schools that are linked by the movements of senior leaders between them. By examining the way those movements cluster schools, we can see the ‘communities’ of connected schools in England. We then explore how likely these staff are to stay in those same communities during their career, and the characteristics of the communities. Finally, we describe the features of schools that produce and attract highly effective leaders.

There is no national labour market for heads and future heads. They operate in tight-knit communities of schools.

- Headteachers and future headteachers have stable jobs and move infrequently. Three-quarters of headteachers, and future headteachers, work in only one or two schools across the ten years we study.
- By examining the movements of the headteachers, and future headteachers, who do change schools, we can identify communities. These are groups of schools between which headteachers and future headteachers move more frequently than would be expected by chance, over the ten years analysed. We find 521 communities of primary schools and 146 communities of secondary schools across the country.
- These communities vary in size. Most primary school communities (88 per cent) and most secondary school communities (70 per cent) are formed by 10 schools or fewer. However, there are some communities with many more schools. In 7 per cent of primary school communities, there are more than 200 schools whereas 8 per cent of secondary school communities have more than 100 schools.
- Movements of headteachers and future headteachers, occur disproportionately within each community. A headteacher, or future headteacher, in a secondary school is 20 times more likely to move to a school within the same community than to a school in another community. For primary schools, they are nine times more likely to remain within the same community.
- We define schools that are not connected to any other school over the ten years as ‘isolated’. Most isolated primary schools are in the North West. Most isolated secondary schools are in the West Midlands, the East of England, and the South East.

Communities are clustered geographically and schools in the same community differ significantly from schools in other communities.

- In primary school communities, 81 per cent are constituted by schools in the same region, as are 55 per cent of communities formed by secondary schools. Additionally, 27 per cent of communities formed by primary schools and 24 per cent of communities formed by secondary schools comprise

schools belonging to only one middle layer super output area (MSOA). MSOAs comprise between 2,000 and 6,000 households and have a resident population between 5,000 and 15,000 people.

- Communities of primary schools with higher average attainment (above the 84th percentile) have pupils with an average of nine extra months of progress compared to communities of primary schools with lower average attainment (below the 16th percentile). This difference is more than 12 months of progress for communities of secondary schools.
- Primary school communities with higher levels of disadvantaged pupils (above the 84th percentile) have an average of 30 per cent of pupils in their schools eligible for free school meals (FSM), while communities with lower levels of disadvantage (below the 16th percentile) have an average of 6 per cent of their pupils in their schools eligible for free school meals. Secondary school communities with higher levels of disadvantage have an average of 37 per cent of pupils in their schools eligible for free school meals, while communities with lower levels of disadvantage have an average of 5 per cent of pupils in their schools eligible for free school meals.
- However, not all differences should be seen as problems. Leaders may develop expertise in specific types of schools and then move to similar schools where they can be most effective.

Schools in London often employ the country’s most effective primary headteachers but they do not necessarily learn their craft there, while a disproportionate number of schools in the North East train and employ top secondary heads.

- Over half of primary schools in London recruit top headteachers.
- Almost half of London primary schools train highly effective headteachers, which is fewer than end up working there.
- Schools in the North East are the most likely to employ highly effective secondary headteachers (around 23 per cent of the region’s schools) and the East of England follows, with around 17 per cent of schools employing top secondary headteachers.
- Many schools in the North East produce highly effective secondary school headteachers (around 20 per cent of the region’s schools), as do schools in the East of England (14 per cent).
- These regions are disproportionately successful in developing and attracting highly effective headteachers despite having a smaller share of the overall teacher workforce. The North East is particularly effective in training and attracting them despite having one of the country’s largest attainment gaps.

It is not necessarily the case that schools of a particular size, level of attainment, or percentage of disadvantaged pupils train or attract the most effective heads.

- Highly effective headteacher are not much more likely to be working in schools of a particular size, level of attainment or percentage of pupils claiming free school meals (FSM). Other factors, such as school culture or leadership opportunities, likely play a larger role in why certain schools attract very effective headteachers.
- Schools hiring from a pool of teachers or headteachers that come from schools with a certain size, level of attainment, or percentage of FSM pupils are not more likely to hire a very effective headteacher.

Recommendations

- Regions with more isolated schools, which do not benefit as much from flows of information from other schools, may benefit from structures to help the diffusion of good practice outside of staff movement. For example, they may rely more on Multi-Academy Trusts (MATs) or local headteachers' groups. To address potential difficulties on recruiting and retaining leadership, they should also consider well-designed GYO (Grow your own) schemes, that would support local teachers to become leaders in their local schools.
- When thinking about recruitment and retention of headteachers, policymakers need to recognise that teachers often move very locally and there is not a national labour market for school leaders.
- The most effective headteachers are not gravitating towards schools that need them the most, such as those with more disadvantaged pupils or lower attainment. MATs and local authorities should explore ways to motivate their better performing school leaders to take on roles in the most challenging schools.
- More research is required to understand why certain areas, in particular London and the North East, have so many schools that produce and attract highly effective headteachers.
- More research is needed on the extent of similarity between schools in the same communities, and how knowledge and information flows between schools within each community. Additionally, it is important to investigate whether the identified communities align with the structure of MATs.

Introduction

In our recent report on the influence of headteachers we found that headteachers and schools are part of small, interconnected networks. These networks, which we call ‘communities’, are formed when schools are connected through a network of shared headteachers or future headteachers, even if those connections span across several schools over time. Schools build relationships in a community through multiple shared leadership links, not just a direct connection between two schools.

While professional networks are often studied to track the spread of ideas and practices, this has not yet been the case for the school workforce in England. Policy discussions typically focus on formal continuing professional development (CPD) to improve headteacher effectiveness, overlooking these informal learning pathways. Leadership practices can also be shared through other means, such as local community collaborations or Multi-Academy Trusts (MATs). However, these means only enhance the deeper and potentially more impactful exchanges that occur through teacher and headteacher movements. Teachers who move schools are fully integrated in a new environment, allowing much more time to understand their new context and introduce new practices.

The limited mobility of teachers and headteachers within clusters of similar schools is also not considered in the recruitment and retention debates. Teacher recruitment targets are set by the Department for Education (DfE) at a national level, assuming free teacher movement across the country, but ignoring these dynamics may have implication for the persistence of inequalities. For example, it is possible for the gap between recruited teachers and recruitment targets to decrease nationally but not in specific communities that have been persistently less attractive.

Moreover, little is known about the characteristics of schools that serve as hubs, attracting and developing top leadership talent for the school system.

In this report we address that gap by:

- Mapping the networks of schools connected by headteachers’ career trajectories.
- Analysing the characteristics of communities where future headteachers cluster during their teaching careers and identifying differences between them.
- Identifying the traits of schools that successfully produce and attract highly effective headteachers.

Approach

In this section we outline our approach to detecting and analysing communities of teachers who are, or will become, headteachers in England. Details on the statistical approach are contained in Appendix A.

We start by detecting how many communities of schools exist in England and how segmented the market is. This shows whether:

- Leadership practices appear to spread rapidly and broadly or are contained within a small group.
- There are schools that lack the opportunity to benefit from these connections, and where they are located.

To explore the potential implications of having a highly segmented headteacher labour market we map the characteristics of schools and headteachers to the identified communities and find the key dimensions along which they differ using descriptive analysis. This shows:

- Whether headteachers' and future headteachers' moves are constrained by geography.
- Whether there are inequalities in the size of communities, headteacher quality, attainment and percentage of FSM pupils between communities.

This will help determine whether some schools may be persistently deprived of having the same opportunities as others to benefit from relevant information flows.

Finally, to guide MATs and school governors in recruiting high quality headteachers, we look at the characteristics of schools that produce them. We also explore the attributes of schools that successfully attract highly effective leaders to identify whether those specific factors seem to influence where they choose to work.

Networks and communities

The core task is to construct the network of schools across which the informal information sharing between leaders or future leaders occurs, which we term "communities".

In our context, we define communities as groups of schools that are formed by schools that share leadership experiences between 2010 to 2019. To identify these communities, we use the Louvain algorithm, a widely used method for identifying naturally occurring clusters in networks.¹ This algorithm identifies communities as groups of schools where headteachers or future headteachers move between schools more frequently than would be expected by chance. It works by maximising the likelihood of movement within communities and minimising movement between them, revealing natural clusters within the network.

This means that there is no single way for communities of schools to be formed. To be part of the same community, two schools must share a headteacher or a future headteacher, i.e., they must be linked. However, it is not enough for a school to be connected to one another through a headteacher or a future headteacher link for both schools to be part of the same community. The algorithm considers not just direct links, but the overall pattern of connections. If two schools do not share many links directly,

¹ Blondel et al., 'Fast Unfolding of Communities in Large Networks'.

the algorithm looks for other schools that might connect them—identifying groups with strong internal ties.²

This algorithm allows us to define more meaningful communities than simply linking any two schools that share a headteacher or a future headteacher. For example, if a headteacher moves from a London school to a school in Newcastle, the algorithm would only group those schools into the same community if they were part of a wider, more connected network. This leads to communities that better reflect how schools share practices and collaborate in real life.

As an illustration of how the community detection works, consider school A that employs teachers and future headteachers who either stay in that school or later move to schools B or C. Consider also that most headteachers or future headteachers from schools B and C either stay at those schools or change jobs to move to school A. Our algorithm will treat this group of schools, school A, B and C, as a community. These schools, throughout the ten years analysed, are likely to share information and practice.

We exclude from our main analysis what we call ‘isolated communities’: communities identified by the algorithm but formed by a single school, with no connections to other schools. These are schools that have no headteachers or future headteachers in common with other schools in the period we study. They are excluded because we cannot distinguish between schools that are isolated from informal networks and schools that simply do not change their headteacher during the period we observe.

Note that the connections between schools and headteachers that we found in our original report are not sufficient to identify communities because they were only identified connections between headteachers. It is very likely that headteachers learn as much from their time as a teacher and leader within a school as they do when they reach headship. That means the relevant network is the one defined by shared connections between both headteachers and future headteachers throughout their careers.

We then assess how segmented the labour market is by using two measures:

- Modularity, which measures how dense the connections within the community are compared with the connections between schools in different communities. This is a measure between -1 and 1. A positive value indicates that schools are more likely to have strong connections within their own community than between different communities, meaning that headteachers are more likely to move within the same community. A modularity close to 1 suggests a much higher level of connectivity within communities than would be expected by chance, while a positive value close to 0 suggests a slightly higher connectivity than expected by chance. A negative modularity score would indicate that schools are more connected across different communities than within their own, suggesting lower internal community connectivity.³
- The likelihood of a headteacher or future headteacher moving within the same community compared to moving to another community.

These two metrics will help determine whether leadership practices are freely shared across a wide range of schools or remain confined to smaller clusters.

² For a pair of schools to be part of the same community, the algorithm will not only consider whether they are linked, but also the number of connections that exist between them and, if two schools are not connected by a large number of links, if there is another school that is highly connected to both.

³ Clauset, Newman, and Moore, ‘Finding Community Structure in Very Large Networks’; Newman, ‘Modularity and Community Structure in Networks’.

To better illustrate these concepts, consider the example community above and call it community X. If we find that most communities in our network of schools are like community X, with a high probability of a headteacher of future headteacher moving to a school within that same community, we are likely to have a labour market that is segmented. This means that if a future headteacher starts their career in a community, they are likely to stay in that community in the following ten years. It also means that any experience a future headteacher or headteacher acquires will be transferred to peers mainly within that community.

Characteristics of communities

If the labour market is segmented, and if there are large inequalities in characteristics between communities, some schools may not have the same opportunities as others to benefit from flows of knowledge and information. Communities can be characterised by the demographics and aptitudes of their pupils, schools, and leaders. We explore differences in community characteristics including:

- Geographical dispersion of schools
- Average headteacher effectiveness
- Average pupil attainment
- Average percentage of FSM pupils

To capture whether movements seem to be constrained by geography we calculate the percentage of communities that have schools in only one region and in only one 'middle layer super output area (MSOA).⁴

We also explore the distribution of average headteacher effectiveness between them. Our measure of headteacher effectiveness is calculated in the first report by using a statistical model that isolates the impact of the headteacher on pupil progress from the impact of pupil demographics and any other school aspects.⁵ That report contains the details of the approach.

To explore differences in time-varying characteristics, such as pupil attainment and percentage of FSM pupils, we compute three-year averages (2017-2019) for each school and then average them by community.

Schools of note

Finally, we analyse schools that produce or attract, at some point in the 10-year period, headteachers in the top 5 per cent of effectiveness. We identify these schools and explore differences between them and the rest of the sample. For schools that produce highly effective headteachers, exploring differences will show whether recruiting from schools with particular characteristics could help in finding a good headteacher. For schools that attract high quality leaders, the differences indicate whether some schools appear to have disproportionate access to the best headteachers.

Our measure of headteacher effectiveness assumes that each headteacher has the same level of effectiveness across different schools and time periods. While this may not be true for every individual headteacher, our first leadership report suggests that, on average, this assumption holds. Therefore, our study cannot identify which schools help transform average headteachers into highly effective ones.

⁴ MSOAs comprise between 2,000 and 6,000 households and have a usually resident population between 5,000 and 15,000 persons.

⁵ Zuccollo et al., 'The Influence of Headteachers on Their Schools'.

However, it is possible to identify schools in which highly effective headteachers were previously employed as teachers. We will call these schools that 'produce' top headteachers.

We define schools that 'attract' highly effective headteachers as schools that employ highly effective headteachers at any point during the 10-year period. These headteachers may have served as teachers before, either at the same school they serve as headteachers or at another school.

We explore differences in the following characteristics:

- Geographic region of the school
- Average attainment
- Average percentage of FSM pupils
- School size (number of students)

To explore whether differences between these schools of note and others are meaningful, we will assess how much the characteristics of the two groups overlap. This will help determine whether most schools in both groups are similar with respect to the above attributes.

Data

The teachers we focus on in this report are those who served as a headteacher at a state-funded school in England between 2010 and 2019. That includes both the teachers who are headteachers and the teachers who take on headship within that period. Including both allows us to map the networks of schools that produce headteachers in England.

The School Workforce Census (SWC), collected annually since 2010, provides detailed information on all staff in state-funded schools in England. We use data from 2010 to 2019, allowing us to track staff movements across roles and schools.

To see which schools are producing, and attracting, the best headteachers, we require a measure of headteachers' effectiveness. We detailed the construction of this measure in this project's first report.⁶ This measure required data on performance measures that come from the National Pupil Database (NPD). These performance measures are also used to construct our average attainment measures for both phases.

We report the impact of headteachers as a standardised effect size by rescaling the distribution of the outcome measure to have a standard deviation of one. These effect sizes, measured in standard deviations (sd) allow for comparability between our results and other education interventions, although they are less straightforward to interpret. We use the Education Endowment Foundation's conversion tables to report months of progress as an outcome, calculated from the effect size.⁷

Data on schools' characteristics and context is gathered from the SWC and an extract of the Department for Education's Get Information About Schools database. We link datasets at the year and school level so that each contract record in the SWC will be associated with the characteristics and outcomes of the school that is their primary employer for that year.

⁶ Zuccollo et al.

⁷ Months of progress are converted from sd using Education Endowment Foundation, 'The EEF's Months of Additional Progress Measure'.

The labour market for teachers who become headteachers

Headteachers' and future headteachers' movements

Table 1 describes our sample. We observe 37,680 staff who are headteachers, or who go on to become headteachers, in 21,829 primary schools and 4,657 secondary schools in England between 2010 and 2019. From those, 18,846 primary schools and 4,147 secondary schools have headteachers or future headteachers in common with other schools in the sample.

Table 1: Description of the analysis sample

School phase	Number of schools	Number of connected schools	Period
Primary	21,829	18,846	2010 - 2019
Secondary	4,657	4,147	

Table 2 shows the number of schools headteachers or future headteachers have served at. Headteachers and future headteachers have stable jobs and move infrequently. We find that 73 per cent of them are only in 1 or 2 different schools across the ten years of data.

Table 2: Number of schools a future headteacher or headteacher has served at

Schools a teacher has served at	Number of teachers	Percentage of total teachers
1	15,580	41%
2	12,014	32%
3	6,426	17%
4	2,734	7%
5	740	2%
6	157	0%
7+	29	0%

Although not very frequent, these movements allow us to see one of the ways leadership approaches and expertise are exchanged between schools. They form the basis of community formation.

Community detection

As mentioned in the Approach section, while two schools must share a headteacher or future headteacher to be part of the same community, it is possible for schools from different communities to be connected (Table 3). In our specific sample, schools that have up to two connections between them

can still belong to different communities. Only if two schools have three connections between them can we be sure they belong to the same community.⁸

Table 3: Minimum and maximum number of connections between schools in different communities

School phase	Minimum number of connections	Maximum number of connections
Primary	0	2
Secondary	0	2

Figure 1 and Figure 2 illustrate examples of three arbitrary primary school communities and three arbitrary secondary school communities (denoted by colours). Each node represents a school and the lines between two schools indicate that they are connected by at least one headteacher movement. It is clear from both figures that there are schools that are connected to each other and still belong to different communities. In both figures, highly connected schools with more links between them are closer to one another, while loosely connected schools, with fewer links between them, are pushed towards the outside of the network graph.

⁸ The maximum number of connections is a result of the algorithm being applied to our particular dataset, not a requirement based on any theoretical reason.

Figure 1: Example of three communities of primary schools

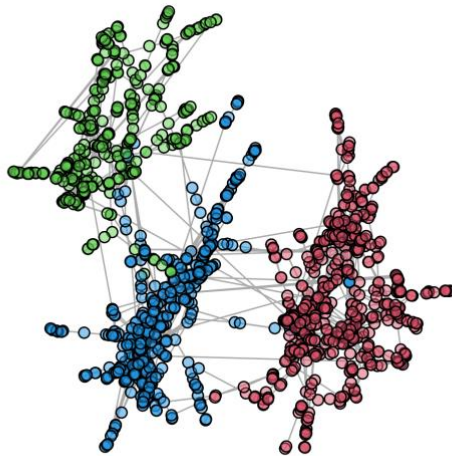
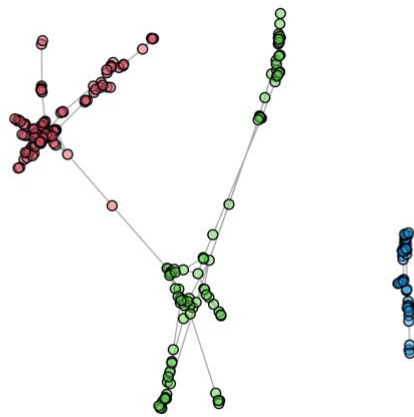


Figure 2: Example of three communities of secondary schools



Market segmentation

Table 4 shows the number of communities after excluding ‘isolated communities’, the number of ‘isolated communities’, and the two measures of market segmentation. We find 521 communities of primary schools and 146 communities of secondary schools that are not ‘isolated’, and 2983 primary and 510 secondary school communities that are.

Table 4: Communities found and degree of market segmentation

Phase	Number of communities (after excluding isolated communities)	Number of ‘isolated communities’	Modularity	Likelihood of a future headteacher or headteacher moving within the same community compared to moving to another (odds ratio)
Primary	521	2983	0.89	9 times more likely
Secondary	146	510	0.85	20 times more likely

We find that the labour market for headteachers and teachers who go on to become headteachers is highly segmented. First, there are many isolated communities. Then, within the network of connected schools, they form very tightly connected clusters. Modularity, defined as the density of connections within the community compared to connections to outside the community, is 0.89 for primary schools and 0.85 for secondary schools. It is positive and close to 1 which means that teachers who will become headteachers and headteachers are much more likely to move within each community than they would be by random chance. A headteacher or future headteacher in a secondary school is 20 times more likely to move to a school within the same community than to a school in another community. For primary schools, they are 9 times more likely.

Table 5 describes the size of communities. There is high variability in community size. Some communities are small, while others are much larger, driven by frequent teacher movements between them. Most primary school communities (88 per cent) and most secondary school communities (70 per cent) are formed by 10 schools or fewer. 7 per cent of primary school communities are formed by between 201 and 800 schools and 8 per cent of secondary school communities are formed by between 101 and 500 schools.

Table 5: Size of communities varies

Phase	Number of schools	Number of communities
Primary	2	341
	3	75
	4	28
	5-10	14
	11-100	13
	101-200	18
	201-800	34
Secondary	2	74
	3-10	31
	11-100	33
	101-500	12

These numbers show that leadership practices are unlikely to spread evenly across schools in England. The movement of headteachers and future headteachers creates a segmented labour market. Whether within a smaller cluster or a larger community of schools, ideas and practices are likely to circulate freely within these communities but less so between them. This highlights the strong internal connections within communities and the relative separation between different groups of schools.

Table 6 shows the geographical distribution of isolated schools (schools that have no connections to other schools). The North West has the highest percentage of isolated primary schools (20 per cent), while Inner and Outer London have the lowest percentage of isolated primary schools (6 and 3 per cent respectively).

For secondary schools, West Midlands, the East of England, and the South East have the highest percentage of isolated schools (15 per cent each), while East Midlands and Inner London have the lowest percentage of isolated schools (5 per cent each). It is surprising that one of the regions with the highest percentage of isolated secondary schools is the West Midlands region, as it is the second most populated county in England (after London), and it includes large cities like Birmingham and Coventry. There is no clear relationship between a region having a high percentage of isolated schools and the level of attainment or the attainment gap in that region (please see Table 11 and Table 12 in the Appendix). These schools may reflect genuinely isolated schools that struggle to recruit headteachers when needed, or to benefit from information flows. However, it may also be the case that these schools are successfully retaining their teachers and leaders for extended periods of time. This distinction is a limitation of our study, stemming from the relatively short time frame analysed.

Table 6: Geographic spread of isolated schools

Phase	Region	Percentage
Primary	North West	20%
	South East	13%
	West Midlands	12%
	East Midlands	10%
	East of England	10%
	Yorkshire and the Humber	10%
	South West	9%
	North East	8%
	Outer London	6%
	Inner London	3%
Secondary	West Midlands	15%
	East of England	15%
	South East	15%
	North West	14%
	South West	9%
	Outer London	7%
	Yorkshire and the Humber	7%
	North East	7%
	East Midlands	5%
	Inner London	5%

These findings show two things: first, that the communities we have detected are meaningful divisions of the labour market and, secondly, that the labour market for school leaders is strongly segmented between communities, with best (or worst) practices being confined within closed groups of schools.

Characteristics of communities

The free movement of practices and ideas within tight-knit communities as opposed to between them may contribute to the persistence of educational inequalities if there are large differences between these communities. In this section we investigate this possibility.

Geography

Though administrative geographies do not determine communities, distance does play a central role in community formation. Table 7 shows that 81 per cent of communities formed by primary schools are constituted by schools in the same region. This is the case for 55 per cent of communities formed by secondary schools. 27 per cent of communities formed by primary schools and 24 per cent of communities formed by secondary schools are constituted by schools belonging to only one MSOA.⁹

It is important though to point out that there are limitations to looking at geography by analysing regions and MSOAs, as they are administrative constructs, making it very likely for teachers who will become or are headteachers to cross them to move jobs. To address this issue, we explore communities that are formed by schools in different regions. When communities include schools from different regions, those regions tend to be geographically close to each other. This suggests that the proximity of schools plays an important role in influencing where headteachers or future headteachers choose to move (see Table 13 in the appendix for more details).

The overlap between regional boundaries and the identified communities emphasises the existence of a regional labour market for headteachers as opposed to a national one.

Table 7: Proportion of communities constituted by schools in the same region or MSOA

Phase	Communities with schools in one region	Communities with schools in one MSOA
Primary	81%	27%
Secondary	55%	24%

Headteacher effectiveness

Figure 3 shows that there is large variation in headteacher quality between communities.¹⁰ The chart shows how much the average effectiveness of headteachers in a community varies between the communities with the most effective headteachers and the communities with the least effective headteachers. For example, in the chart of primary school communities, it shows that the communities with the least effective headteachers (below the 16th percentile) have an average effectiveness of only 0.33sd, whereas the communities with the most effective headteachers (above the 84th percentile) have an average effectiveness of over 0.49sd. In secondary schools, communities with the least effective

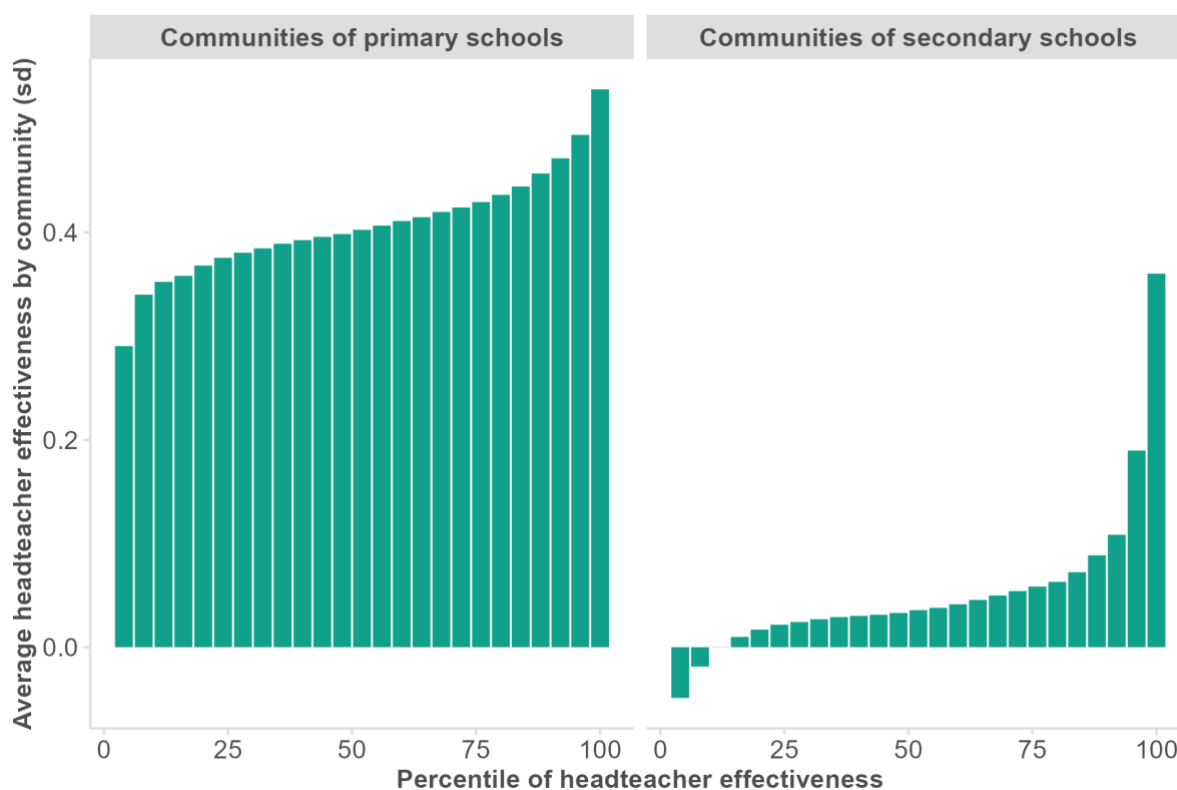
⁹ There are on average 4 schools in each MSOA.

¹⁰ For the figures in this section, instead of showing averages for each community we aggregate these into 25 equally sized bins. The aggregation is done to avoid the risk of disclosing individual schools, as some communities have a low number of schools.

headteachers have an average effectiveness of only $-0.01sd$, whereas the communities with the most effective headteachers (above the 84th percentile) have an average effectiveness of over $0.17sd$.

Overall, we find that in communities with a higher average headteacher effectiveness, headteachers contribute $0.15sd$ in primary schools and $0.18sd$ in secondary schools, or 2 additional months of progress, compared to headteachers in communities where they are less effective. Please see Table 14 in the appendix for details.¹¹

Figure 3: Headteacher effectiveness varies between communities



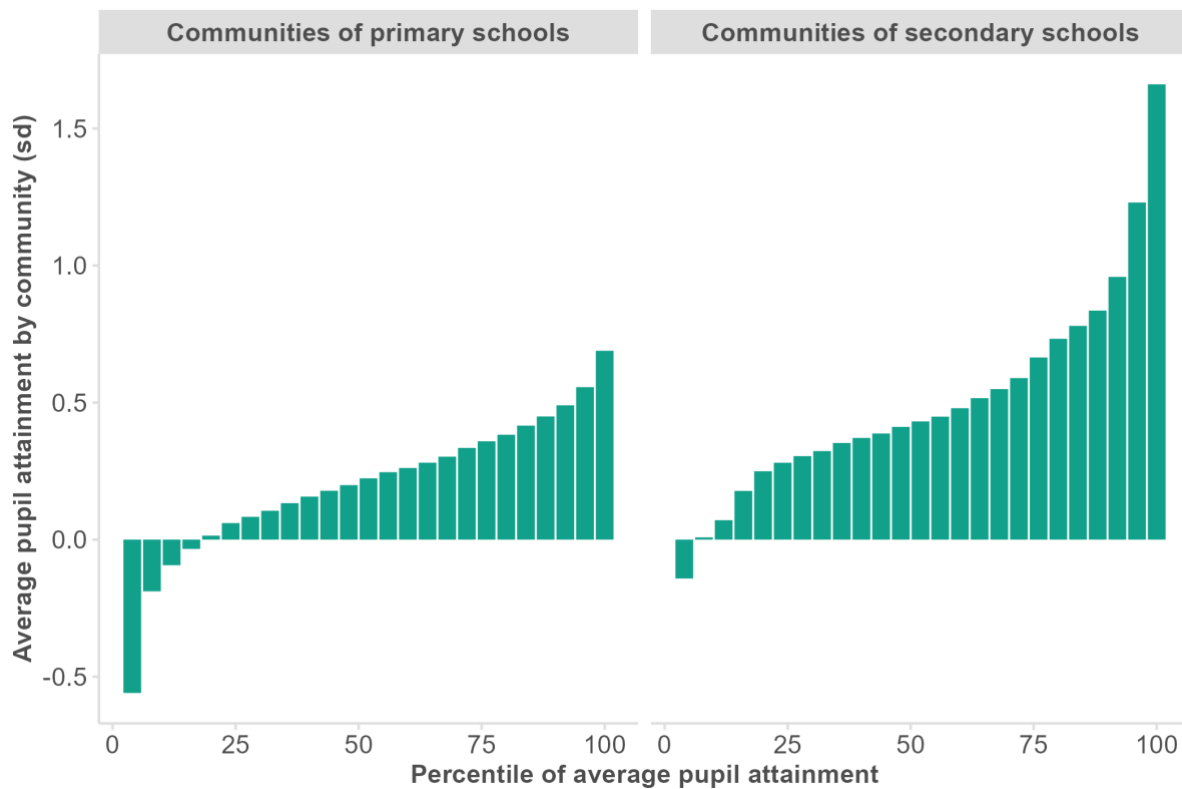
Note: Headteacher effectiveness is calculated as in the original report on the influence of headteachers on their schools. We aggregate effectiveness by school and then by community. Then we divide the sample into 25 groups with equal number of communities and average head effectiveness for each of them.

Pupil attainment

Figure 4 illustrates how average attainment varies between communities. Higher attaining communities of primary schools have pupils with an average $0.77sd$ more, or 9 extra months of progress, compared to lower-attaining communities. The difference is $1.1sd$, or more than 12 months of progress for communities of secondary schools. See Table 15 in the appendix for details. The implication of this is that headteachers who are teaching in high attaining schools in 2010 are very likely to still be in high-attaining schools in 2019, even if they do move schools. The same holds true for headteachers who begin the period in lower-attaining schools. That suggests the informal information flows of collegiality between school leaders at higher- and lower-attaining schools might be limited.

¹¹ Note that average headteacher effectiveness measures do not map to those reported in our first report. This is because here we are aggregating headteacher individual measures at school level and then aggregating those school level measures at community level. Different schools have different numbers of headteachers, and different communities have different numbers of schools. Also note that primary and secondary effectiveness measures are not directly comparable, since we are using different performance measures for each when calculating effectiveness (see the Data section for more details).

Figure 4: Average pupil attainment varies between communities

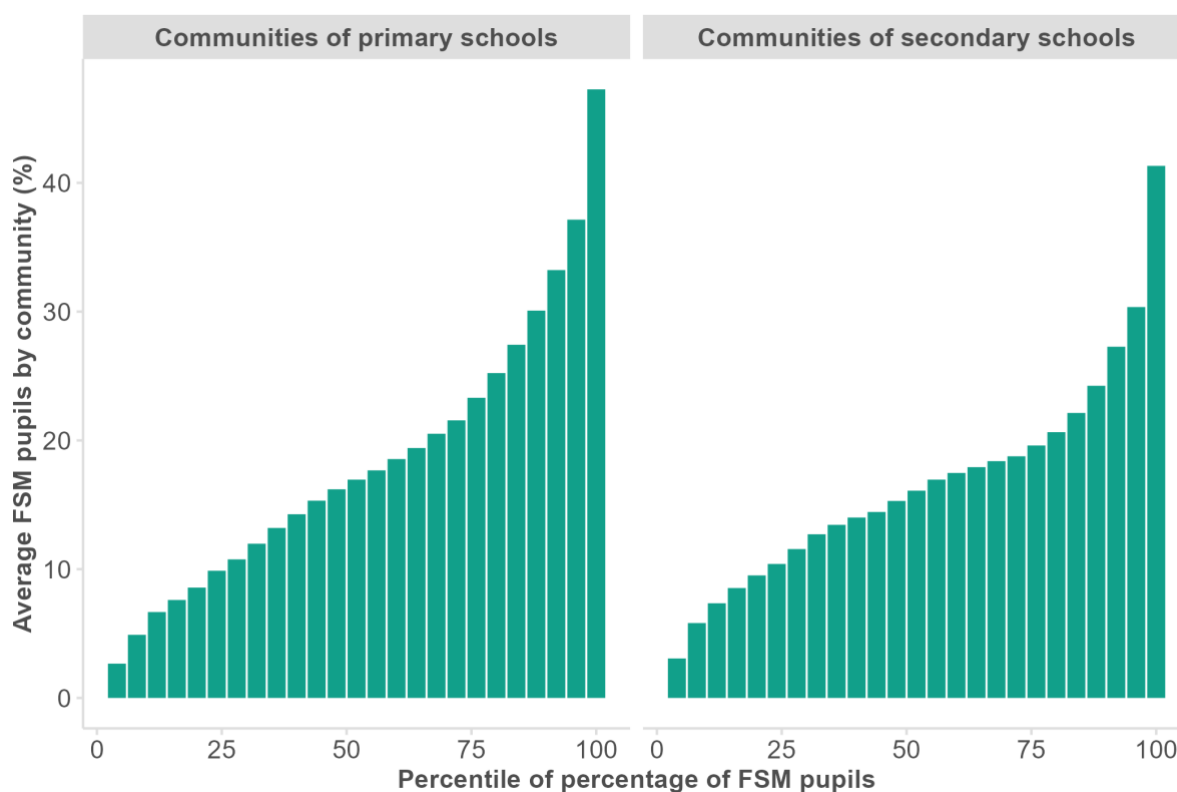


Note: To calculate average school attainment, we average pupil KS2 and KS4 progress measures for each school and year and standardise it by year. We then average this measure across three years of data (2017 to 2019) to get an average value for each school. We then average these across communities. We then divide the sample into 25 groups with equal number of communities and average this attainment measure for each group.

Disadvantage

Figure 5 shows that primary school communities with higher levels of FSM pupils (above the 84th percentile) have an average of 30 per cent of FSM pupils in their schools while communities with lower levels of FSM pupils (in the bottom 16th percentile) have an average of 6 per cent of FSM pupils in their schools. Secondary school communities with higher levels of FSM pupils have an average of 37 per cent of pupils in their schools while communities with lower levels of FSM pupils have an average of 5 per cent in their schools. See Table 16 in the appendix for details.

Figure 5: Average percentage of FSM pupils varies between communities



Note: To calculate average percentage of FSM pupils we average the percentage of FSM pupils across three years of data (2017 to 2019) and get an average value for each school. We then average these across communities. Then we divide the sample into 25 groups with equal number of communities and average this measure for each of them

As with the attainment charts (Figure 4), this shows that there is imperfect mobility of school leaders between schools with different levels of disadvantage. However, it is worth noting that not all differences should necessarily be interpreted as problems. For example, it may be that leaders build expertise in leadership at a particular type of school and then match to similar schools later because that is where they can contribute the most. These market segmentations may indicate limited informal information flows but that does not mean more information would always be beneficial to the schools.

The variation on all the measures above is not related to size of communities. It is not more likely for a smaller community to have higher or lower average headteacher quality, higher or lower average attainment or higher or lower average percentage of disadvantaged pupils. Table 17 in the appendix shows the coefficients from correlations between size and these variables, and none are statistically significant.

The limited mobility of future headteachers and headteachers within communities of similar schools may have implications for recruitment and retention, especially for matching effective headteachers to schools in which they are most needed. Schools within the same community share similar characteristics and are different from those outside the community. As a result, a teacher in a leadership role at a high-performing school, or one with a low proportion of FSM pupils, is likely to advance to headship at a school with similar traits. This tendency can reinforce existing patterns and limit the diversity of leadership experiences across different types of schools.

Schools of note

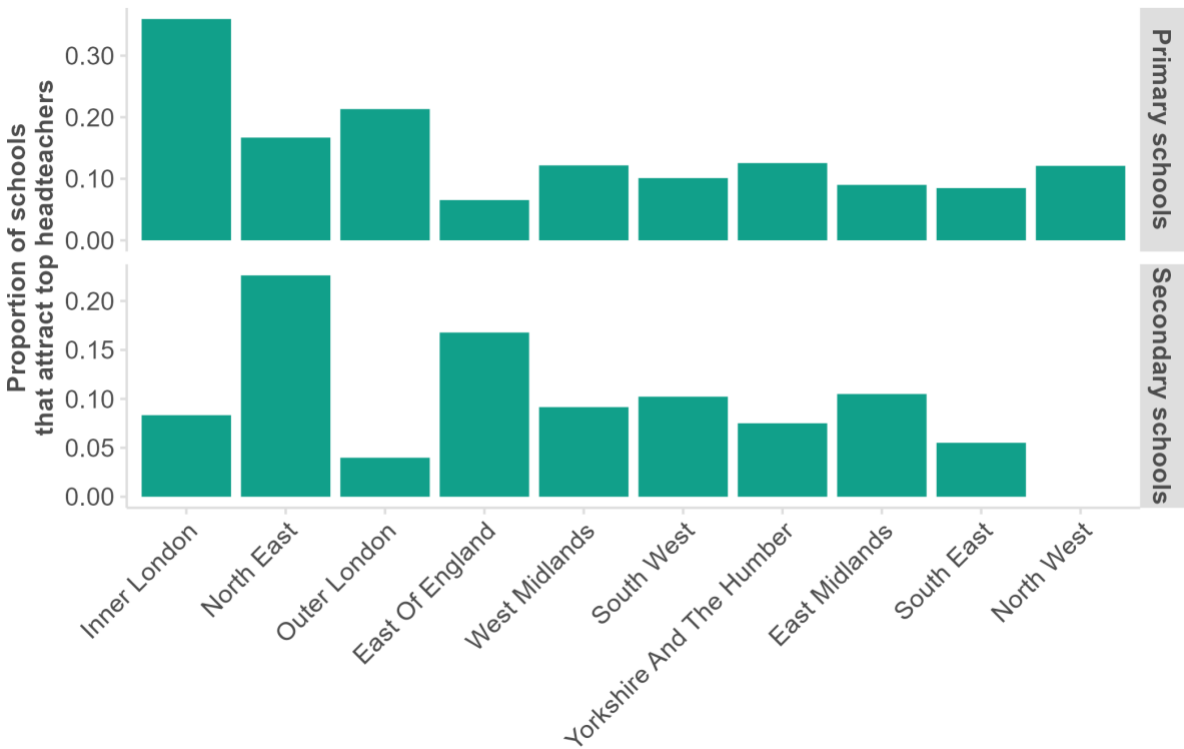
Geography

We now focus on schools that, at some point in the 10-year period, attract the top 5 per cent of headteachers who most contribute to students’ progress, as well as those that produce them.

Figure 6 shows that over half of the primary schools in London attracted a top headteacher at some point between 2010 and 2019. In secondary schools, around 23 per cent of the schools in the North East attracted top headteachers over the same period. The East of England follows, with around 17 per cent of the schools attracting highly effective headteachers.

In our original report, we describe average headteachers’ effectiveness by region. Both for primary schools and secondary schools we find that average headteacher effectiveness is higher in Inner and Outer London. In this extension we go deeper and explore where extremely effective headteachers are attracted to. While we find that top headteachers are attracted to London, where average effectiveness is also higher, we also find that some regions in which average headteachers’ effectiveness is low are still attracting top headteachers. This is the case for secondary schools in the North East and means that there is likely a high dispersion of effectiveness in this region.

Figure 6: Proportion of schools in the region that employed a top headteacher between 2010-2019



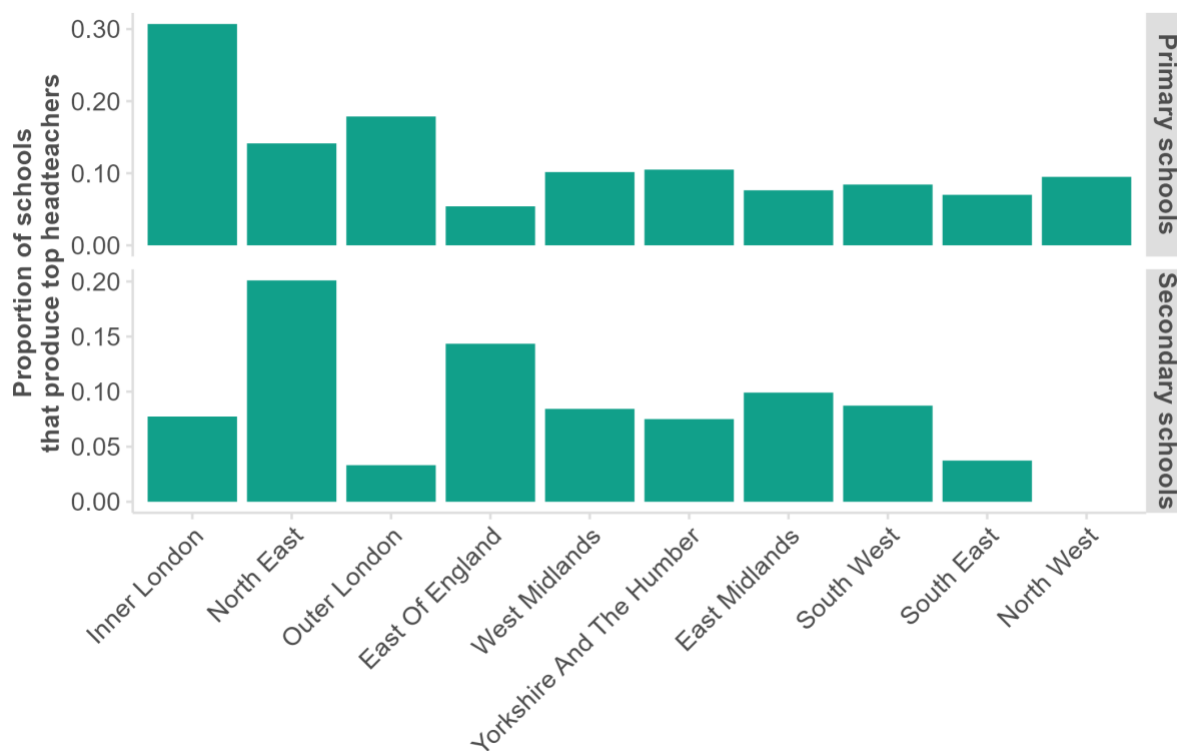
Note: Data on the North West region for secondary schools has been suppressed due to low counts.

Figure 7 shows that almost half of primary schools in London employed a top headteacher before they progressed to headship, which is fewer than end up working in the region. For secondary schools, around 20 per cent of the schools in the North East produce highly effective headteachers and around

14 per cent of schools in the East of England produce them. Only 11 per cent of schools in London employ teachers who will go on to be top headteachers.

This shows that some regions, despite having a smaller share of the overall teacher workforce, are disproportionately successful in developing and attracting highly effective headteachers.

Figure 7: Proportion of schools in the region that employed a teacher who went on to become a top headteacher between 2010-2019



Note: Data on the North West region for secondary schools has been suppressed due to low counts.

To explore whether differences between these schools of note and others are meaningful, we assess the probability that a school randomly picked from the group of schools that attract or produce the most effective headteachers will have higher attainment, a higher number of disadvantaged pupils or greater size than a school picked randomly from the group of remaining schools. We call this ‘probability of superiority’. If the probability of superiority is close to 50 per cent, this means that the probability of finding a very effective headteacher in a specific group of schools is not higher than finding a very good headteacher in the other. Although we find that most differences between groups that produce or attract effective headteachers and other schools are statistically significant, when comparing the chance of finding a highly effective headteacher in both groups we find that they are not meaningful. They do not help us identify where to find these highly effective leaders or which factors attract them to their jobs.

Pupil attainment

Contrary to what would be expected, very effective headteachers do not seem to be particularly attracted to schools with very high average attainment. In primary schools there seems to be no statistically significant difference in average attainment between schools that attract the most effective

headteachers and the rest (Table 8).¹² Schools that attract the top 5 per cent of headteachers have an average attainment of 0.32sd, while the remaining schools have an average of 0.42sd. This difference is quite small (equivalent to around 2 months of progress), and there is only a 44 per cent chance that a school randomly picked from the group of schools that produce the top heads will have higher attainment than a school picked at random from the remaining schools.

Both for primary and secondary schools, the probability of finding a highly effective headteacher in a low attaining school is nearly the same as in a high attaining one. This shows that selecting a school from the high-attainment group does not guarantee a significant advantage in finding a top headteacher. Primary schools that produce the most effective headteachers have higher levels of pupil attainment on average than those that do not and secondary schools that produce the most effective headteachers have lower. However, for both phases, a large proportion of schools in a group have average attainment that is very similar to those in the other group. In primary schools, the difference is extremely small, translating into a difference of 0 months of progress. In this case, there is only a 54 per cent chance that a school picked at a random from the group of schools that produce the most effective headteachers will have higher attainment than one picked at random from the group of schools that do not. For secondary schools, there is only a 43 per cent chance a school randomly picked from the group of schools that produce the most effective headteachers will have a higher average attainment than those that do not.

Table 8: Average pupil attainment in schools that attract or produce top headteachers

Phase	Sample	Mean	Standard deviation	Mean difference	Probability of superiority
Attract v does not attract top headteachers					
Primary	Attracts	0.18	0.53	0.01	51
	Does not attract	0.16	0.34		
Secondary	Attracts	0.32	0.53	-0.10	44
	Does not attract	0.42	0.44		
Produces v does not produce top headteachers					
Primary	Produces	0.21	0.47	0.05	54
	Does not produce	0.16	0.36		
Secondary	Produces	0.31	0.53	-0.11	43
	Does not produce	0.42	0.44		

Disadvantage

Again, perhaps contrary to the common belief, effective school leaders do not seem to be attracted to schools with a low percentage of disadvantaged students (Table 9). Primary schools that attract highly effective headteachers have on average 21 per cent of FSM pupils and those that do not have on

¹² This is the only mean difference in the whole section that is not statistically significant. The p-value is 0.14.

average 17 per cent of FSM pupils. Secondary schools that attract the most effective leaders have on average 16 per cent of FSM pupils and those that do not have on average 18 per cent of FSM pupils. The magnitudes of the differences are, again, quite small. There is a 60 per cent chance that a primary school picked at a random from the group of schools that attract the most effective headteachers will have a higher percentage of FSM than a randomly chosen school from the group of schools that do not. For secondary schools, that probability is 44 per cent.

There are also small differences between schools that produce highly effective headteachers and schools that do not, in terms of percentage of FSM pupils. This shows that being a teacher at a school with a high or low proportion of disadvantaged pupils does not help predict whether that teacher will be an effective school leader. Primary schools that produce the top 5 per cent of headteachers have on average 4 percentage points more FSM pupils than those that do not. Secondary schools that produce the most effective headteachers have on average 21 per cent of FSM students and those that do not have on average 17 per cent of FSM students. Again, these differences are small. In primary schools, there is a 59 per cent chance that a school picked at a random from the group of schools that produce the most effective leaders will have a higher percentage of FSM than a school picked at random from the remaining. For secondary schools, there is a 45 per cent chance a school picked at random from the schools that produce the most effective headteachers will have a higher percentage of FSM students than the rest.

Table 9: Average percentage of FSM in schools that attract or produce top headteachers

Phase	Sample	Mean	Standard deviation	Mean difference	Probability of superiority
Attract v does not attract top headteachers					
Primary	Attracts	21	14	4	60
	Does not attract	17	12		
Secondary	Attracts	16	10	-2	44
	Does not attract	18	11		
Produces v does not produce top headteachers					
Primary	Produces	21	14	4	59
	Does not produce	17	12		
Secondary	Produces	16	10	-2	45
	Does not produce	18	11		

School size

We find no evidence for the size of a school being a factor that influences where very effective headteachers choose to work. Primary schools that attract the top 5 per cent of headteachers are on average larger in terms of pupils than those that do not (around 43 more pupils on average), while secondary schools that attract highly effective headteachers are smaller in terms of students than those that do not (around 158 fewer pupils on average). Both differences are relatively small (Table 10). In primary schools, there is a 57 per cent chance that a school randomly chosen from the group of schools

that attract the most effective headteachers will have a higher number of pupils than a school randomly chosen from the group of schools that does not. For secondary schools, there is a 40 per cent chance a school randomly picked from the pool of schools that produce the most effective headteachers will have a higher number of pupils than those that do not.

It is not more likely for a headteacher that comes from a smaller or larger school to be a very effective headteacher. Primary schools that produce highly effective headteachers are larger in terms of pupils than those that do not, by around 53 more pupils on average. Secondary schools that produce highly effective headteacher are smaller in terms of pupils than those that do not have them, by around 145 pupils. Once more, these differences are small. In primary schools, the probability of superiority is 59 per cent. For secondary schools, it is of 41 per cent.

Table 10: Average number of pupils in schools that attract or produce top headteachers

Phase	Sample	Mean	Standard deviation	Mean difference	Probability of superiority
Attract v does not attract top headteachers					
Primary	Attracts	323	172	43	57
	Does not attract	280	164		
Secondary	Attracts	820	422	-158	39
	Does not attract	979	415		
Produces v does not produce top headteachers					
Primary	Produces	333	174	53	59
	Does not produce	280	163		
Secondary	Produces	832	425	-145	41
	Does not produce	977	415		

In summary, the most effective headteachers in primary schools select into schools with higher percentage of FSM and more pupils. Very effective headteachers in secondary schools select into schools with lower attainment, lower percentage of FSM students and lower number of students. Although these differences are statistically significant, they are small, meaning that it is not much more likely for a highly effective headteacher to be attracted to schools with one of these attributes. Other factors likely play a larger role in why certain schools attract very effective headteachers.

The most effective headteachers do not seem to be ‘trained’ at any particular kind of school. Although there are statistically significant differences in attributes between the group of schools that produces effective leaders and the rest, there is a high chance to find very effective headteachers in either of them. This means that average attainment, average percentage of FSM pupils and school size are not reliable predictors for selecting headteachers.

Implications

Isolated schools may need structures to help the diffusion of good practices

Regions with isolated schools – the North West, West Midlands, the East of England, and South East – are more likely to struggle to organically spread best practices or innovative teaching and leadership methods through future headteachers' and headteachers' movements. It is important therefore that they make good use of other networks they may potentially belong to, such as MATs or local headteacher groups. More support should also be provided to these regions, which may include more targeted CPD or assistance in creating artificial networks across communities, such as digital connection platforms or cross-community CPD programs.

Policy makers need to consider regional labour markets for teachers and headteachers

Earlier evidence points to significant regional variation in the teacher labour market in England. Teacher and headteacher shortages in England vary by region, as well as the proportion of teachers with relevant degrees, with London having the highest proportion of qualified teachers.¹³ Our earlier research also finds that there is a 'local pay gap': there are significant differences in pay for non-teachers across regions, which makes recruitment challenges unequal between them. This regional variation extends to headteacher effectiveness. In our first report measuring headteacher effectiveness, we find that average headteacher effectiveness varies across the country, being greater in London.¹⁴ In this report, we show that headteacher effectiveness and the opportunity of being exposed to best practices by other peers also depends on the region the headteacher or future headteacher is in. All this points to the importance of recognising these regional labour markets.

MATs and local authorities should explore ways to motivate their better performing school leaders to take on roles in schools that need them the most. Our findings show that the most effective headteachers are not gravitating towards schools that need them the most, such as those with more disadvantaged pupils or lower attainment. MATs and local authorities should explore ways to incentivise successful headteachers to take on leadership roles in these challenging schools.

More research should be done on identifying why there are areas that disproportionately produce and attract highly effective headteachers

It is not clear why certain areas, in particular London and the North East, have so many schools that produce and attract highly effective headteachers. More research is needed to understand which policies or specific practices at these schools are so effective at helping teachers develop into highly effective leaders.

More research should be done on how information flows within communities and if gaps caused by low mobility can be mitigated by MATs

More research is needed on how knowledge and information flows between schools within each community. Additionally, it is important to investigate whether the identified communities align with

¹³ Zuccollo, 'Six Charts That Explain the State of the Teaching Workforce in England'; Sibieta, 'The Teacher Labour Market in England'.; Sibieta, 'The Teacher Labour Market in England'.

¹⁴ Zuccollo et al., 'The Influence of Headteachers on Their Schools'.

the structure of MATs. This would help understand whether knowledge gaps caused by low headteacher mobility can be mitigated by MAT networks.

Appendix A: Approach

Community detection

We start with a bipartite network of schools and teachers who eventually become headteachers. We project this bipartite network into a unipartite network of schools to find schools that are connected by teacher moves.

We then apply the Louvain algorithm to detect communities. This is based on modularity optimization. Modularity measures the strength of the community structure, or how dense the connections within the community are compared with the connections between schools in different communities. The algorithm starts as if each school (node) is a community. It then considers moving a community to its neighbour community, doing so if modularity is maximised. This process is repeated until the highest possible level of modularity in the network is reached. It is important to notice that headteachers may still move between communities, but this will be less likely than moving within communities.

In the end we get a modularity measure. A high modularity, positive and close to 1, indicates that a network has a clear division into distinct communities, with dense connections within communities and sparser connections between them.

Appendix B: Tables

The labour market for teachers who become headteachers

Table 11: Regional performance for primary and secondary schools

Primary	
Region	% of pupils meeting the expected standard in reading, writing and maths (combined)
London	71
North East	67
South East	66
North West	65
Yorkshire and The Humber	64
East of England	64
South West	64
East Midlands	63
West Midlands	63
Secondary	
Region	Average progress 8
Outer London	0.24
Inner London	0.18
East of England	0
South East	-0.01
Yorkshire and The Humber	-0.02
East Midlands	-0.06
West Midlands	-0.06
South West	-0.06
North West	-0.18
North East	-0.24

Source: Key Stage 2 and Key Stage 4 Performance tables (2018/2019).

Table 12: Regional gaps in months of progress

Region	Primary	Secondary
South West	11	21.1
East of England	10.9	19.8
South East	10.7	20.6
East Midlands	10.7	19.9
Yorkshire & The Humber	10.5	20.1
West Midlands	9.6	18.6

North West	9.5	20.2
North East	8.9	20.7
London	5.2	10.4

Source: EPI Annual Report 2024 (data from the 2018/2019 academic year).¹⁵

Community characteristics

Table 13: Most common pairs of regions within communities

Pair of regions	Number of communities
Primary schools	
East of England & Outer London	44
South East & South West	44
North West & Yorkshire and the Humber	42
Outer London & South East	42
East Midlands & North West	41
Inner London & Outer London	41
East of England & South East	40
South East & West Midlands	40
South West & West Midlands	40
East Midlands & East of England	39
East Midlands & South East	39
East of England & North West	39
East of England & South West	39
North West & Outer London	39
North West & South East	39
East of England & West Midlands	38
East of England & Yorkshire and the Humber	38
North West & South West	38
East Midlands & West Midlands	37
Inner London & South East	37
North West & West Midlands	37
South East & Yorkshire and the Humber	37
East Midlands & Yorkshire and the Humber	36
East of England & Inner London	36
West Midlands & Yorkshire and the Humber	36
East Midlands & Outer London	35
East Midlands & South West	35
Outer London & South West	35
South West & Yorkshire and the Humber	35
Inner London & North West	34

¹⁵David Robinson et al., 'EPI Annual Report 2024'.

Inner London & South West	34
Outer London & West Midlands	33
Outer London & Yorkshire and the Humber	33
Inner London & West Midlands	31
East Midlands & Inner London	30
Inner London & Yorkshire and the Humber	29
North East & Outer London	24
North East & Yorkshire and the Humber	24
East Midlands & North East	23
North East & North West	23
North East & South East	23
East of England & North East	22
North East & West Midlands	21
North East & South West	19
Inner London & North East	16
Secondary schools	
Outer London & South East	32
East of England & Outer London	29
East of England & South East	28
East Midlands & West Midlands	27
Outer London & West Midlands	27
South East & West Midlands	26
East Midlands & East of England	25
East Midlands & Outer London	25
East Midlands & South East	25
North West & West Midlands	25
East of England & West Midlands	24
East Midlands & Yorkshire and the Humber	23
West Midlands & Yorkshire and the Humber	23
North West & Yorkshire and the Humber	22
Outer London & South West	22
East Midlands & North West	21
Inner London & Outer London	21
North West & Outer London	21
North West & South East	21
Outer London & Yorkshire and the Humber	21
South East & Yorkshire and the Humber	21
South East & South West	20
East of England & Inner London	19
East of England & Yorkshire and the Humber	19
East of England & South West	18
South West & West Midlands	18
East of England & North West	17
Inner London & South East	17

East Midlands & South West	16
Inner London & West Midlands	16
North West & South West	15
East Midlands & Inner London	13
Inner London & Yorkshire and the Humber	13
South West & Yorkshire and the Humber	13
Inner London & North West	12
Inner London & South West	11
North East & West Midlands	11
East Midlands & North East	10
North East & Outer London	10
North East & South East	10
East of England & North East	<10
Inner London & North East	<10
North East & North West	<10
North East & South West	<10
North East & Yorkshire and the Humber	<10

Table 14: Headteacher effectiveness in communities

Phase	Below 16th percentile	Above 84th percentile
Primary	0.33	0.49
Secondary	-0.01	0.17

Table 15: Average pupil attainment in communities

Phase	Below 16th percentile	Above 84th percentile
Primary	-0.23	0.54
Secondary	0.02	1.12

Table 16: Average percentage of FSM students in communities

Phase	Below 16th percentile	Above 84th percentile
Primary	5.43	36.63
Secondary	6.08	29.70

Table 17: Correlations between size and characteristics

Characteristic	Phase	Estimate	P-value
Head effectiveness	Primary	0	0.12
	Secondary	0	0.96
Average attainment	Primary	0	0.31
	Secondary	-0.001	0.12
Percentage of FSM pupils	Primary	-0.002	0.64
	Secondary	0.02	0.11

Schools of note

Table 18: Regions that attract the most effective headteachers

Region	Proportion of schools that attract top headteachers
Primary schools	
Inner London	35.96%
Outer London	21.32%
North East	16.69%
Yorkshire and the Humber	12.55%
West Midlands	12.17%
North West	12.10%
South West	10.11%
East Midlands	9.01%
South East	8.49%
East of England	6.54%
Secondary schools	
North West	-
North East	22.61%
East of England	16.78%
East Midlands	10.50%
South West	10.22%
West Midlands	9.16%
Inner London	8.33%
Yorkshire and the Humber	7.51%
South East	5.51%
Outer London	3.99%

Table 19: Regions that produce the most effective headteachers

Region	Proportion of schools that produce top headteachers
Primary schools	
Inner London	30.71%
Outer London	17.88%
North East	14.14%
Yorkshire and the Humber	10.51%
West Midlands	10.16%

North West	9.50%
South West	8.44%
East Midlands	7.64%
South East	7.01%
East of England	5.41%
Secondary schools	
North West	-
North East	20.10%
East of England	14.35%
East Midlands	9.91%
South West	8.73%
West Midlands	8.43%
Inner London	7.74%
Yorkshire and the Humber	7.51%
South East	3.74%
Outer London	3.32%

Table 20: Percentage of teachers in each region

Region	Percentage of teachers in the region (primary and secondary)
South East	15.80%
North West	13.29%
East of England	11.32%
West Midlands	11.09%
Outer London	10.35%
Yorkshire and The Humber	9.67%
South West	9.45%
East Midlands	8.39%
Inner London	5.88%
North East	4.72%

Note: Data from School Workforce in England (2019).

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