

Cognitive Load Theory and worked examples

Can putting yourselves in your students' shoes help you to become a better teacher? Former maths teacher turned research manager **Kiran Arora** reflects on his experience of using Cognitive Load Theory and worked examples to tackle new areas of learning

Cognitive Load Theory (CLT) is becoming more and more popular in education. Suggested to be the "single most important thing for teachers to know" by British educationalist Professor Dylan Wiliam, it has also been cited by Ofsted in its most recent Education Inspection Framework (EIF).

However, despite all the literature and research available on this topic, it was not until I attempted to self-learn an unfamiliar area of mathematics that I started to fully empathise with students who have to learn new topics, and recognised the importance of the way information is presented to them.

So, what is Cognitive Load Theory? First researched by educational psychologist John Sweller, CLT is based around the idea that our "working memory" can only deal with a limited amount of information at one time and that overworking this part can cause "cognitive overload". Sweller (1988) argues that there are three different types of cognitive load:

- **Intrinsic:** The difficulty of the task, determined by prior knowledge or learning.
- **Extraneous:** This load is created by the way in which a problem is presented to a learner. De Jong (2010) suggests that "learning is hampered when working memory capacity is exceeded in a learning task". To be effective teachers, we want to minimise this load.
- **Germane:** This aids in learning, as this load results in "resources being devoted to 'schema' acquisition". (Paas, Renkl & Sweller, 2003). Schemas

are mental constructs enabling us to understand and categorise information quickly, reducing working memory load.

Striving to learn

While studying for my Master's in mathematics education at the UCL Institute of Education, I was tasked with learning an unfamiliar area of mathematics, documenting my experience and identifying how the process could help me as a teacher.

I chose to learn how Rivest–Shamir–Adleman (RSA) encryption works and to create my own encryption. RSA is the basis of a cryptosystem used to encrypt and decrypt sensitive messages. It works by using two keys, a "public" key to encrypt information and a "secret" one to decrypt the message. For example, anyone can encrypt details such as a password when logging onto an account, but only the intended recipient can decode the password as they are the only one who has this "secret" key.

I decided to start by throwing myself in at the deep end. I tried to learn the topic by simply looking at the process and learning the formulae, a strategy with which I was previously successful.

However, on this occasion it just did not work for me. The unfamiliarity of the topic was overwhelming and I quickly found myself drowning. There was too much for me to think about and process. I found that I was inundated with information and that this was stopping me from learning the material,

theoretically or practically. Sweller would argue that I had given myself an extraneous load. My working memory was stretched and was unable to access or form any schema in my attempt to create an RSA encryption.

This made me realise how intimidating it can be to be introduced to a new topic. As a mathematics teacher, with pressure to complete the required content in time for exams, I was sometimes guilty of teaching new content formally and as quickly as possible.

However, after my encounter with RSA, I appreciated the importance of planning and how the structure of my lessons could help or hinder a learner's ability to process and retain information.

I had to find a different way of learning...

A new approach

As I reflected on this unusual experience, I realised that I did not understand how the RSA system could or would be useful; how it would work in the "real world". So I found a video online that broke down RSA encryption with a relatable example that I was able to process.

It was a revelation. Instead of discussing numbers, formulae and algorithms, this video put the information in a way I could simply relate to. The video's basic explanation reduced my cognitive load – therefore I was

“ When studying a new topic, I do not think that simply handing out a worked example is enough for students to grasp the topic – and this was reinforced by my personal journey studying RSA encryption ”

able to devote more of my "working memory" to understanding and using the algorithms to create my own public and private keys.

At this point, armed with a new understanding of the system, I decided to look at a worked example of creating an RSA encryption. For this, I used another online video. The constructive use and clear layout of the example made me fully grasp the concept and steps needed. There was no superfluous information, just clear and concise steps to help me understand the process to create my own RSA encryption.

The 'worked example' effect

When studying a new topic, I do not think that simply handing out a worked example is enough for students to grasp the topic – and this was reinforced by my personal journey studying RSA encryption.

Ward and Sweller (1990) suggested that in some conditions "worked examples are no more effective, and possibly less effective, than solving problems". It was not enough for me to have just a worked example to read or watch. The prompts to be engaged in the example helped massively.

Renkl (2005) said that students only get a deep understanding through examples when they:

- Are self-explanatory.
- Provide instructive explanations based on simple principles.
- Aid relationships between different representations.
- Highlight the relevant content.
- Isolate meaningful building blocks.

Discovering this information and appreciating it led me to question how I used worked examples in my own teaching practice. Previously, I would simply find a worked example either online or in a textbook, without fully reviewing the information provided, the layout or the complete needs of my students. I was now able to change my approach in the classroom.

An improved teacher

This experience of taking on the role of a student again definitely helped me improve as a teacher. As a result, I made a few key changes to my teaching to make the content easier to access. From then on, I kept in mind three main points when planning and delivering lessons:

- The way in which material is presented to students can greatly affect their

learning. Starting a new topic from a formal, abstract position can be daunting for students, and a barrier for them to grasp the information.

- Cut out inessential information. What I thought might be "interesting" to students as they were learning the topic was probably not, nor was it helping them to learn.
- Think about your worked examples and whether they are fit-for-purpose for your lessons.

Although all of this theory can be found in the sources in this article and many beyond, I truly recommend teachers taking on the role of a student more often – it helped me to improve my lessons and teaching. You may even learn something new!

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Further information & research

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Keeping your early career teachers

Amid the challenges of teacher recruitment, the retention of early career teachers has become even more crucial for schools. **Matt Walker** and **Suzanne Straw** consider how the teaching profession can effectively support and retain early career teachers

It is well-documented that England is experiencing an unprecedented challenge in relation to teacher recruitment and retention.

With rising pupil numbers in secondary schools, shortfalls in the number of trainee teachers and increasing numbers of working-age teachers leaving the profession (SecEd, 2018 & 2019), doing more to retain teachers in the state sector is a crucial part of helping to address this key issue.

Recent years have seen alarming attrition rates in the profession. Of particular concern is the rate with which teachers are leaving the profession early in their careers – within the first three to five years.

Retention rates of early career teachers have dropped significantly

between 2012 and 2018 (Worth et al, 2018). The first five years are the critical years when the right development opportunities, nurture and support can make or break a teaching career.

Given the significant financial and personal commitment involved in an individual's decision to train to teach, the cost of training teachers, and the fact that new teachers are quite literally the future of the profession, this issue clearly needs addressing as a matter of urgency.

School leaders and teachers welcome the fact that the Department for Education (DfE) has made this a focus, with the Early Career Framework (ECF) offering definite steps in the right direction (DfE, 2019; SecEd, 2019).

It is notable that the retention of early career teachers is also high on the agenda at an international level, with the issue being the focus of this year's United Nations Educational, Scientific and Cultural Organisation's (UNESCO) World Teacher's Day in October.

What does it take to keep early career teachers in the classroom?

In 2018, the National Foundation for Educational Research (NFER) was commissioned by the DfE to research the experiences of early career teachers (those teachers in their first three years of teaching).

The report, *Early career continuing professional development: Exploratory research* (Walker et al, 2018), aims to identify the factors that lead early

career teachers to feel fulfilled in their roles and therefore more likely to stay in teaching. It also looked at which factors are most likely to lead to a lack of fulfilment and the danger of them walking away.

One of the most significant findings of the research was that the translation of hopes and expectations to lived experiences at the chalkface can lead to “practice shock”, summarised by one research participant as follows: “When you go through your (initial teacher training) placements, you can't truly understand how much work there is to do, or how much responsibility comes with the job. So I think that kind of hit me hard in the NQT year.”

The reality of getting to grips with new routines, a new work/life balance and new expectations – and feeling like a “beginner” all over again, regardless of previous achievements – can come as a surprise.

“ The ECF is being rolled out in selected pilot areas from September 2020, and nationally from September 2021. However, the framework is available now, and we would recommend that schools familiarise themselves with the detail and consider what the implementation and workload considerations might be ”

And unless these issues are addressed, there is a high risk of new teachers walking away from the profession well before they might have anticipated doing so. Therefore, support from colleagues to help them settle into their new roles, and to acclimatise to the school environment is of key importance.

Our report found that areas in which teachers in their first year in the classroom feel they need most training include behaviour management, assessment, pedagogy, and supporting students with particular needs.

During this first year, positive factors in supporting the development of new teachers include the presence of:

- A supportive mentor, who is ideally a subject specialist and respected by the mentee as a practitioner in the classroom.
- A balanced package of support, typically involving a standardised training programme alongside more personalised, teacher-led opportunities.
- A supportive school culture.

In the second year, the importance of avoiding a one-size-fits-all model of CPD becomes clear in this report. Many teachers reported wanting more “light touch” support that allowed them the time and space to “hone their craft”, while others were keen to begin to pursue opportunities for progression into middle leadership and specialist roles.

In this second year in the classroom, our research suggested that the levels of support offered by senior staff or mentors varies in terms of regularity and formality of contact.

Positive experiences reported by teachers in their second or third year broadly chimed with those in their first year, with an emphasis on the need for bespoke training and support and, once again, the benefits of a supportive whole-school development culture.

Emotional support was cited as something needed by early career teachers but which was not always effectively addressed. In addition, several early career teachers highlighted that they would value more dedicated time to reflect on their training and development.

Moving forward

The introduction of the ECF has been broadly welcomed by the teaching profession and appears to address many of the issues highlighted by early career teachers.

The introduction of dedicated training materials and fully funded mentor training, with time for this taken into account, is a positive step forward.

Providing sufficient training and development for early career teachers is vital in helping to address the issue of the practice shock that new teachers can experience as they enter the classroom.

It is also encouraging to see that the development of the ECF has been evidence-based, with direct involvement of credible and experienced educational professionals. It certainly feels as if the government is engaging directly with teachers in a pragmatic move to address the teacher recruitment and retention challenge.

The ECF is being rolled out in selected pilot areas from September 2020, and nationally from September 2021. However, the framework is available now, and we would recommend that schools familiarise themselves with the detail and consider what the implementation and workload considerations might be for their particular environment.

Matt Walker is a research manager and Suzanne Straw is a research director at the National Foundation for Educational Research (NFER).

Further information & research

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Flexible and part-time working in practice

Rising pupil numbers mean that England's schools need more teachers each year, especially in secondary schools where pupil numbers are forecast to rise by 15 per cent over the next decade. **Caroline Sharp** looks at how increasing part-time and flexible working opportunities could help keep teachers in the profession – and in your school...

How many teachers in your school work part-time? If it is around 22 per cent, then that is average for secondary schools in England. Now think of your staff profile – do you have many teachers in their 30s and 50s? If so, you might expect more part-time working.

But would you welcome a request for reduced hours as an opportunity to hold onto valuable teachers. Or would you see it as a complication that you could do without?

As we said in a previous Research Insights article for *SecEd* (2019), part-time working is less common in secondary than primary schools – and the evidence suggests that a lack of part-time work drives some teachers to leave and is a barrier to enabling some ex-teachers to return.

We have recently been researching the views and experiences of teachers and school leaders in relation to part-time and flexible working. Our report (NFER, 2019) finds that, excluding those who said they would ideally like to reduce their hours but cannot afford to work part-time, 36 per cent of secondary teachers and leaders would ideally like to work part-time compared to the 19 per cent who currently do so.

Accordingly, the report estimates that around one in six secondary school teachers would like to reduce their hours, and around one in 12 would like to reduce their hours by more than a day a week.

We think this is an over-estimate of the actual demand, because it is highly unlikely that all of these teachers would actually reduce their hours if given the opportunity. But it does suggest that there is a considerable number of

teachers who would like to work part-time but are currently working full-time.

So what is preventing these teachers from reducing their working hours? Just under a third of the teachers who wanted to work fewer hours and could afford to do so, said that they had not made a formal request for part-time working because they suspected their senior leaders would not allow them to change. One in 10 said that they were concerned about the potential impact on their promotion prospects.

However, only 14 per cent reported that they have had a request for part-time working rejected. This suggests that the perception that school leaders would not support a request for part-time working is a greater deterrent than teachers' actual experience of having a request turned down.

What are the barriers and benefits for schools?

According to the leaders we interviewed, their main concerns about part-time and flexible working were to ensure continuity for pupils and fit the available staff hours into the timetabling "jigsaw". They were worried about communication issues and the additional costs involved in employing more teachers and paying for handover time.

On the positive side, the key benefits of enabling part-time and flexible working include: increased teacher retention, improved staff wellbeing, retaining specialist expertise and a broad curriculum offer, and – where full-time staff are underutilised – an opportunity to reduce costs.

“ Schools with high levels of part-time working tended to use a two-week timetable, and to schedule their part-timers first. They made up for the reduction in hours in a variety of ways, including asking part-time staff to increase their hours, using trusted supply teachers, approaching recent retirees, or sharing teachers with other schools ”

Why proactive leadership is crucial

Our research found that proactive school leadership is a key characteristic of schools with high proportions of part-time staff.

This can include being systematic about asking for annual submissions to change working patterns well in advance of the new school year, checking these with timetables and staffing forecasts, and then negotiating further with staff – who also need to be flexible when discussing their requests.

Schools with high levels of part-time working tended to use a two-week timetable, and to schedule their part-timers first. They made up for the reduction in hours in a variety of ways, including asking part-time staff to increase their hours, using trusted supply teachers, approaching recent retirees, or sharing teachers with other schools. School leaders also ensured that there were strong communication systems in place so that part-time staff can have easy access to all the information they need.

The report adds: "School leaders attempted to ensure continuity for pupils by minimising the number of subject teachers and form tutors working with each group. Some schools had arranged for teachers to share the role of form tutor, and had increased flexibility by separating registration from pastoral sessions."

Can leaders work part-time?

Some of our interviewees were adamant that part-time working was incompatible with a middle or senior leadership role. For example, one told us: "I make it crystal clear that if they want to go part-time, they will be stepping down from their responsibility area."

Others said that it worked well in their schools. Several interviewees explained that leaders working part-time delegated some of their responsibilities to a less experienced member of staff, which had the added benefit of preparing these teachers to take on middle and senior leadership roles.

One school had reviewed all leadership responsibilities, asking themselves: "Why does this member of staff need to be here?" They concluded that not all senior staff had to be on site at all times and this enabled some members of the senior leadership team to work part-time.

What about other kinds of flexible working?

Our research found few examples of flexible working patterns for teachers (such as staggered or compressed hours, or allowing staff to work from home). This is despite the potential demand for it from teachers – for example, to enable them to drop off and collect their own children from school.

Teaching requires teachers to be present in the classroom and the typical school day allows few opportunities for flexibility. Our interviewees referred to other requirements for teachers to be on site, such as form tutor periods, departmental planning, preparation and assessment (PPA) sessions, whole-staff meetings and training.

It seems that enabling more flexible, as opposed to part-time, working patterns requires further consideration. However, having said that, a recent *SecEd* case study provides an example of how one school allocated blocks of time on the timetable to each faculty area which enabled more flexible working patterns (*SecEd*, 2018).

Where next?

School leaders with high proportions of teachers working part-time had

typically identified the barriers and sought solutions wherever possible. This included planning and negotiating teachers' working patterns to suit both the needs of individuals and the needs of the school.

They also strengthened their communication systems and found alternatives to traditional ways of managing non-teaching responsibilities including PPA and pastoral care.

Given the growing teacher supply challenge and the fact that there is currently a large group of teachers in their mid-30s (when part-time employment peaks), school leaders need to consider how to make flexible and part-time working part of their schools. Not doing so risks emulating King Canute, trying forlornly to hold back the tide. Better to welcome the challenge, see it as an opportunity, and to reap the benefits. **SecEd**

Caroline Sharp is a research director at the National Foundation for Educational Research (NFER). She tweets as @Caroline_Sharp1

Further information & research

- ▶ To download NFER's report *Part-time Teaching and Flexible Working in Secondary Schools* (June 2019) visit <http://bit.ly/2ZH9ovV>
- ▶ For more on NFER's work in the School Workforce area, visit www.nfer.ac.uk/research/school-workforce
- ▶ *Part-time working: Making it work*, *SecEd* and NFER, Research Insights January 2019: <http://bit.ly/2H1awWE>
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- ▶ This article is part of *SecEd*'s regular NFER Research Insights series, which offers practical advice for schools based on the latest research findings. A free pdf of the latest Research Insights best practice and advisory articles and an archive of past content can be found in the Knowledge Bank section of the *SecEd* website: www.sec-ed.co.uk/knowledge-bank/

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Progress 8: Is it time to tinker?

There has been some debate about the inherent unfairness of Progress 8 towards schools with higher proportions of disadvantaged and SEN pupils. **Dr Lesley Duff** looks at the evidence...



One of the biggest changes made to the accountability system in recent years was the introduction of Progress 8 in 2015/16 as the principle headline performance measure for all secondary schools in England (secondary schools were given the opportunity to opt into the new accountability measures in 2014/15, although only about 10 per cent did).

This marked an important shift by Department for Education (DfE) ministers away from using a threshold measure as the main way of judging secondary school performance to using a value-added measure.

This was an important development because, as readers of this article will know, prior attainment is a key factor in explaining how well children do at the end of school.

Indeed, Education Endowment Foundation analysis (2013) shows that a pre-test score (key stage 2) explains around half of the variation in GCSE scores (depending on the subject).

Prior to the introduction of Progress 8, the headline threshold measure in use was the proportion of pupils in a school achieving five or more A* to C grade passes, including English and maths.

There had been several concerns about using a threshold measure to hold schools to account. As well as not taking account of pupils' prior attainment, there were fears that some schools were focusing disproportionate effort and resource on pupils on the C/D grade borderline.

NFER's own research (2018) into accountability systems in different countries highlights the way in which threshold measures can distort school behaviour, encouraging them to focus on children just below the threshold, at the expense of those expected to perform comfortably above or well below the threshold.

Progress 8 was designed to address these concerns. The DfE also said it would encourage schools to offer a broad and balanced curriculum, with a focus on an academic core at key stage 4, to focus on all of their pupils – as every increase in a grade will count towards their score – and to measure performance across a broader curriculum of eight qualifications.

Should Progress 8 also take account of other factors?

Many commentators agree that Progress 8 has been an improvement compared to the previous threshold measure as it takes account of, or "controls" for, prior attainment.

However, does it go far enough? There are some concerns that Progress 8 does not take account of differences in pupil demographics and socio-economic factors, which can vary substantially as Figure 1 (below) shows.

Why should this matter to schools? Research shows that pupils from disadvantaged backgrounds achieve around half a grade lower in each subject

compared to non-disadvantaged pupils with similar prior attainment.

Furthermore, disadvantaged pupils outperform their more advantaged peers on average in only six per cent of state secondary schools, which has not really changed since the introduction of Progress 8, despite the DfE's official statistics for key stage 4 2018 (published January 2019) suggesting that the disadvantage gap is narrowing.

This has a disproportionate effect on schools with higher proportions of disadvantaged pupils on their rolls. Recently published research by Leckie and Goldstein (2018) suggests that more than a third of "underperforming" secondary schools would no longer fall into the category if progress measures were reweighted to account for pupils' backgrounds.

A school having a low progress outcome that is reported in the public domain can potentially have other significant ramifications. For example, the school may be more likely to be inspected by Ofsted, which may pass an unfavourable judgement, or they may have difficulty in attracting and retaining new teachers and/or pupils.

An alternative viewpoint

There are therefore some strong arguments for refining Progress 8 to take account of differences in pupil demographics and socio-economic factors, but there is also a counter perspective to this.

One of the objectives of this and previous governments is to achieve higher levels of social mobility. The education system is one of the key levers that the government has to take forward this objective. Ministers want to ensure that the right incentives are in place to encourage schools to close the attainment gaps that exist between disadvantaged and non-disadvantaged pupils, between pupils with SEN and those without, between boys and girls, between different ethnic groups, and so on.

If the DfE was to change the Progress 8 measure to control for demographic and socio-economic factors this could arguably weaken these incentives for schools to help their pupils achieve their full potential.

So what is the answer?

There is no perfect answer, but most people agree that Progress 8 is much better than the threshold measure used previously, as taking account of prior attainment

tough on schools with less affluent intakes not to take these factors into account in some way – and perhaps does not stretch "higher" performing schools in affluent areas sufficiently.

Various solutions have been proposed, including developing an adjusted Progress 8 measure that takes account of demographic and socio-economic characteristics or the proposal from the National Association of Head Teachers (September 2018) to only compare Progress 8 scores across school groups with similar pupil intakes to one another.

NFER believes that this is the time to take a fresh look at this to see whether Progress 8 can be refined so that all schools feel they are being more fairly judged in future.

• *Dr Lesley Duff is director of research at the National Foundation for Educational Research*

Further information

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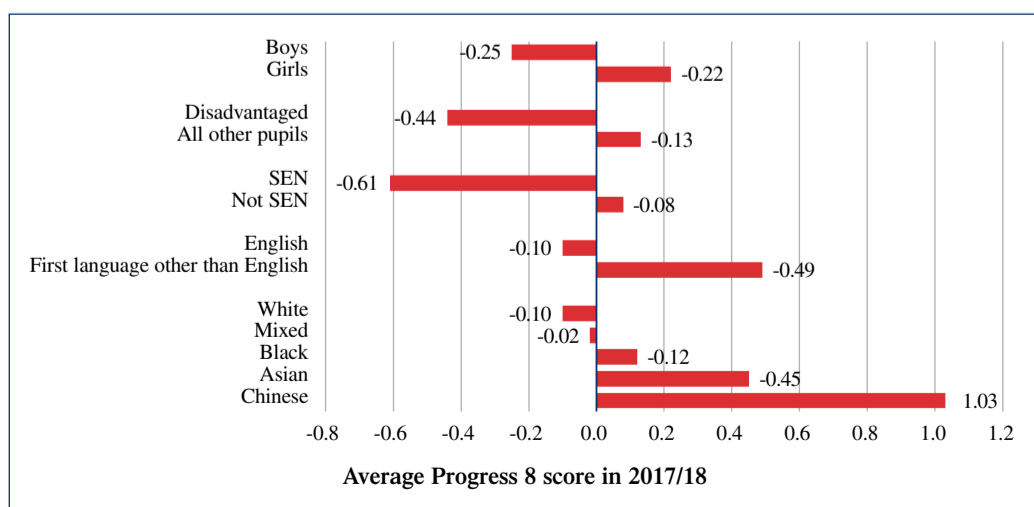


Figure 1: Progress 8 scores can vary markedly by pupil characteristics

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Part-time working: Making it work

Part-time and flexible working could become a vital tool if we want to retain secondary teachers in the profession in the coming years. **Jens Van den Brande** looks at the evidence

Ensuring there are enough high-quality teachers in the sector is crucial for delivering a first-class education for young people. However, as the number of secondary pupils is forecast to increase by 19 per cent over the next decade, attracting and retaining enough secondary teachers is a key challenge facing school leaders today.

A recent report by the National Foundation for Educational Research (NFER) looking at teacher retention highlights that increasing part-time and flexible working opportunities for teachers is likely to encourage more teachers to stay in the profession (*Teacher workforce dynamics in England*, October 2018).

The prospect of large numbers of full-time teachers moving to part-time can on its own present a risk to teacher supply – for example, a *Guardian* article last year suggested that if 40 per cent of teachers go down to four days a week, we would need another 40,000 extra people to replace them. However, our research evidence leads us to think there are important reasons to be more positive about the overall effects of more part-time working.

So, why is it imperative for secondary schools to take proactive action to become more flexible employers?

An unmet demand

There is unmet demand for part-time working in the secondary sector, which drives some teachers to leave.

Our research has shown that many secondary teachers who leave teaching for another job, switch from full-time to part-time work. Among secondary teachers who leave for another job, the proportion working part-time rises by 20 percentage points after leaving, which suggests that this unmet demand for part-time work is partly driving some secondary teachers to leave the profession. It also suggests that more flexible working opportunities could have encouraged some of them to stay.

A sustainable option

Part-time working needs to be a more sustainable option for teachers. We found that the difference in leaving rates between part-time and full-time teachers is greater in secondary schools than in primary schools. This may indicate that part-time teachers in secondary schools find it more difficult to sustain the demands of part-time working alongside their other responsibilities.

Improving the retention of part-time teachers would help to ensure that success in accommodating more part-time working for those who want it leads to sustained retention in the profession.

Inflexible schools?

A lack of flexibility is a barrier to potential returners. The relative inflexibility of secondary schools is not only having a negative impact on leaving rates, but it is also creating a barrier to re-entry for secondary teachers who wish to return to teaching – for example, former teachers who left the profession to raise a family and are now ready to return as their children are a little older.

Our recent evaluation of the Return to Teaching pilot (June 2018) identified a lack of part-time and flexible working opportunities as one of the main barriers facing secondary teachers who want to return to the profession.

This barrier was particularly cited by career-breakers, a group of potential returners who otherwise would have the greatest potential to make a successful return with minimal support.

So, what can we do?

This all begs the question: what can secondary schools do to become more flexible employers?

In the March 2018 Teacher Voice Omnibus, school leaders said that the complexity of secondary school timetabling is the main reason why part-time teaching is more difficult to accommodate.

Timetabling issues, along with attitudes and cultures in some schools, mean that flexible opportunities are not as widespread as some teachers would hope.

However, our analysis of the latest teacher workforce data (DfE, June 2018) shows that almost a quarter of secondary schools have a proportion of part-time teachers that is more than 30 per cent, well above the average of about 19 per cent. These are likely to be schools that the sector can learn most from in terms of accommodat-



ing part-time working for their staff and there is probably one of these secondary schools near you (which you can check using the information in a downloadable spreadsheet – see further information).

Therefore, if you're a school leader who wants to improve the working arrangements in your school, why not explore how other schools have managed to overcome barriers to flexible working, such as timetabling, cost and promoting a culture that encourages flexible working. Sharing best practice in overcoming the barriers to providing flexible working opportunities can go a long way to improving teacher retention issues in the secondary sector in the long-term.

While we would encourage school leaders to proactively find ways of accommodating greater flexibility for staff, teachers who would like to work part-time also do need to respect the challenge that school leaders face in ensuring the school is fully staffed at all times.

“The secondary teacher workforce has a large group of teachers approaching their mid-30s, which is when part-time employment peaks”

Not all part-time teachers can work a four-day week with Fridays off. Teachers being flexible on what arrangements they are willing to accept would make the task of senior leaders who are open to accommodating flexible arrangements much easier.

But it is quite possible that some of the unmet demand for part-time work isn't actually about wanting to work part-time at all. Perhaps it is much more about how manageable a full-time job as a secondary school teacher currently is.

Teachers work just over 50 hours per week on average during term-time, considerably more hours than nurses and police officers work in a normal working week. School leaders need to bear in mind that teachers' requests to work part-time and flexibly might be a symptom of an unmanageable workload in term-time. Secondary schools should use line management effectively to identify workload issues and intervene to increase support and reduce workload pressures where issues are identified.

The secondary teacher workforce has a large group of teachers approaching their mid-30s, which is when part-time employment peaks. It's also when teaching roles tend to come with more responsibilities and the demands of family life are at their height for many teachers.

This means that the next few years are a critical time for taking action to make the job of a full-time secondary teacher more sustainable and to provide opportunities for more flexible approaches to accommodate the growing demand for part-time working.

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Information & references

- The school workforce is one of eight key topic areas for NFER. For more information and to read its research in this area, visit www.nfer.ac.uk/key-topics-expertise/school-workforce/
- To download NFER's latest report – *Teacher workforce dynamics in England*, October 2018 – visit www.nfer.ac.uk/teacher-workforce-dynamics-in-england/
- *Evaluation of the Return to Teaching Pilot Programme*, NFER, June 2018: <http://bit.ly/2S2BtKx>

- *Flexible working sounds lovely, but it would make the teacher shortage worse*, *Guardian*, February 2018: <http://bit.ly/2US9Zcr>
- *Teacher Voice Omnibus: March 2018 survey*, Department for Education, March 2018: <http://bit.ly/2A2KvAk>
- *School workforce in England: November 2017*, Department for Education, June 2018: <http://bit.ly/2KwCJVv>
- To download the NFER's spreadsheet of schools with high proportions of part-time staff, go to <https://tinyurl.com/y7kgqlfa>
- See also, *Flexible working: A case study*, *SecEd*, November 2018: <http://bit.ly/2SWbYuf>



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The growing pupil population...

There is a growing demand for secondary school places in England. **Zoe Claymore** explores what the data tells us and the possible implications for schools and teachers



With rapidly rising pupil numbers, a current shortage of places in one-fifth of local authorities and high parental expectations, secondary school admissions are arguably about to come under even more of a spotlight than usual.

Demand has already risen

Nationally, pupil numbers in state secondary schools have risen by 69,000 since January 2013 and now stand at nearly 2.85 million (as of January 2018), the highest level since the start of the decade. Secondary school applications also rose by 83,000 between 2013 and 2018, a rise of 17 per cent.

School applications data also shows that 96 per cent of local authorities had more applications in 2018 than they had five years previously. However, although most of the local authorities in England have seen some growth over this period, as Figure 1 shows, growth rates differed significantly by region.

Too few places to meet demand

Some local authorities may already be feeling the impact of this rapidly rising demand. In January 2018, 29 local authorities, nearly one in five, received more secondary school applications from families who live in their borders than there were places available.

This is a sharp increase from January 2014, when only 17 local authorities had more secondary school applications than places.

The excess demand in these oversubscribed local authorities is also getting worse. In 2014, the 17 oversubscribed local authorities received 191 more applications on average than they had spaces available. However, in 2018, the 29 oversubscribed local authorities received an average of 234 more applications than places available.

The shortage of places is most acute in urban areas. In 2018, 27 of the 29 local authorities that were short on places were cities such as Birmingham, Nottingham and Bristol, and London boroughs – particularly outer London boroughs such as Greenwich, Ealing and Croydon.

In contrast, areas with a large surplus of places appear to be largely rural. In 2018, there were 14 local authorities which had more than 1,000 surplus places, which were largely rural counties such as North Yorkshire, Norfolk and Cumbria. These large surpluses in some areas appear to suggest problems with place planning at a regional

or national level. A surplus of this magnitude could indicate that some rural schools are struggling to remain viable, and difficult decisions may be required to ensure school places are located in the areas where they are needed.

Rising competition?

There has also been a steady increase in the proportion of families not getting a place at their most preferred school or a place in any one of their top three preferences.

Figure 2 shows the gradual increase in the percentage of families whose school preferences are not being met. As before there are big regional variations, with London worst affected. One in three families in London did not get their top preference in 2018, while about one in eight did not get any of their top three preferences.

The number of appeals is rising

Over the last three years the number of families who have had an appeal heard about their secondary school allocation has also risen slightly. In 2015/16, the proportion of parents appealing secondary school allocations was 3.6 per cent, which rose to 4.1 per cent in 2017/18.

While part of this may be due to the rising secondary pupil numbers since 2015/16, it may also be an outcome of growing tensions caused by greater competition for places and falling percentages of families being allocated a place in any of their top preferred schools.

Demand set to rise further

The supply and demand trends, along with a reduction in parental preferences being met, are particularly worrying as the Department for Education's (DfE) own projections indicate that there will be an extra 376,000 pupils in the secondary school system by January 2023 compared to 2018 levels (see figure 3).

This is largely due to the increase in the live birth rate in England from around the early to late-2000s. Overall, secondary pupil numbers in January 2023 will be 16 per cent higher than 10 years earlier.

What can local authorities do?

As local authorities know how many children they have in their primary schools, it should be possible

for them to accurately predict the number of places needed at secondary level in any given year well in advance and take action to create sufficient pupil places. Many local authorities will have already started to make plans to meet this growing demand for places, although knowing about the growing demand and having the ability to implement changes at sufficient speed can be a challenge.

There are several ways that the available secondary capacity in a local authority may be increased, each of which will have an impact on school leaders. A new free school could be opened, which depending on its size could bolster capacity significantly, albeit not for a few years as there are considerable steps to work through, from navigating the complex planning process and finding a suitable site to hiring sufficient numbers of new staff. While a new school adds capacity, it also increases competition to attract pupils, which may be an issue for any local schools which are judged by Ofsted to be underperforming.

Another lever that local authorities may seek to use, which can be quicker to implement, is to work with school and academy leaders to expand an existing school. Local authority schools or academies may agree to take on a bulge class for one or more years, or to increase the number of form classes in the school, or expand existing classes. The local authority will work with school leaders in their planning area to explore whether they have scope to expand to help meet this extra demand or whether they can take on extra pupils within their existing structures, all of which brings extra challenges.

National data suggests that increasing secondary class sizes may already be happening as they average 1.1 pupils more than they did in 2013/14. Figure 4 shows that the number of classes with more than 30

pupils has also risen by 2.1 percentage points since 2013/14.

What does this mean for schools?

With secondary school places in England projected to continue to increase, and at an even faster rate than seen in the previous half decade, this could have a big impact on secondary schools. Without a considerable increase in places available in key areas, there could be yet more local authorities that do not have enough spaces to meet demand. This may lead to a rising number of families not receiving a place at one of their top preferred schools, increasing tension with parents and the unhappiness of pupils, who have to attend a secondary school they did not want.

There are also significant potential consequences for school leaders and teachers. School leaders may have to deal with more issues around reduced pupil engagement, more requests from parents seeking to move their child to/away from their school, and greater pupil mobility.

Teachers may be increasingly likely to teach in crowded schools or teach larger classes. Extra pupils, even if they can be accommodated in temporary classrooms, may put pressure on all school services, such as dining halls, sport facilities and pastoral care provision. These factors could have negative consequences for staff recruitment and retention, which may already be a problem area for the school.

So brace yourselves, as the next few years look likely to be challenging. It is important that the DfE looks urgently at how they can support local authorities and schools in areas where there are not enough school places to meet demand.

• Zoe Claymore is a researcher at the National Foundation for Educational Research.

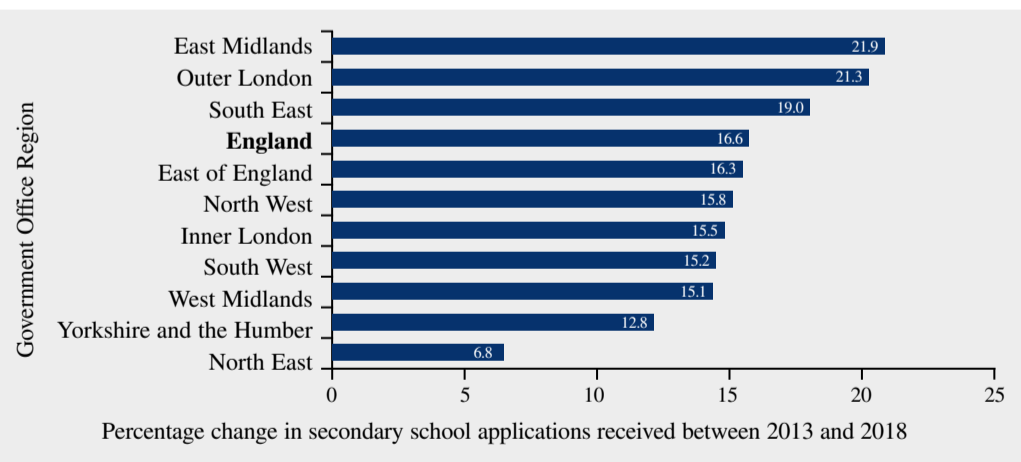


Figure 1: Pupil numbers have risen in all regions, with some having larger increases than others

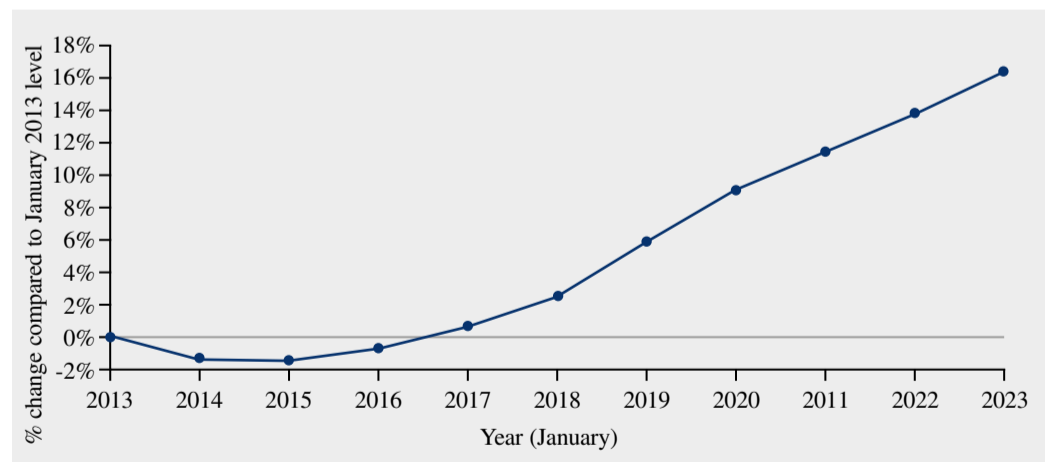


Figure 3: Pupil numbers in state secondary schools are projected to continue to rise

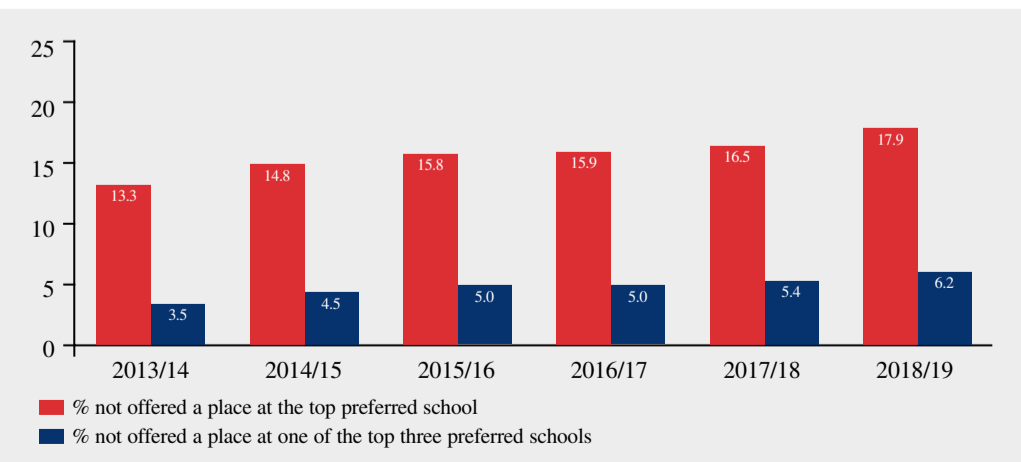


Figure 2: More pupils are not being allocated a place at their preferred secondary schools

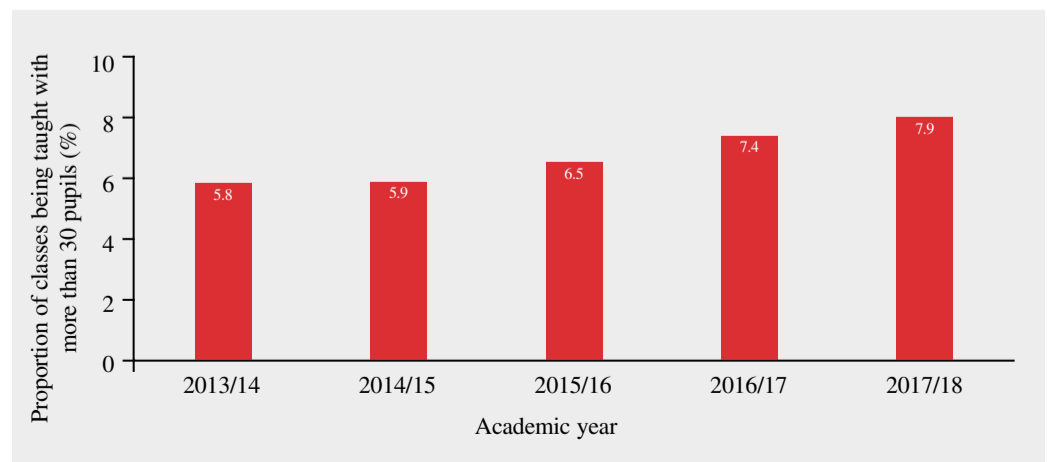


Figure 4: The proportion of classroom teachers teaching large classes is rising