frontier economics

PUBLISHING'S CONTRIBUTION TO SCHOOL EDUCATION

The role of educational materials in teacher time savings

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Frontier Economics

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1 EXECUTIVE SUMMARY

Published textbooks are likely to pay for themselves: conservatively, they need to save teachers only four-and-a-half minutes per day to do so.

Textbooks can help improve educational outcomes by increasing the quality of learning. But how much value do they contribute by saving teachers' time?

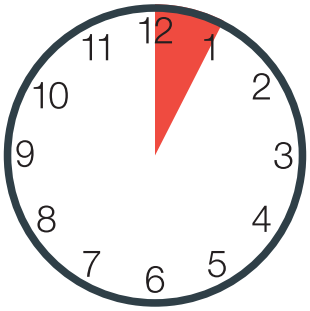
£4.8bn per year

The total value of all the time UK teachers spend on preparation

£196m per year

The total UK spend on printed resources

If textbooks save more than 4:30 minutes per working day …



… then they 'pay for themselves' in teacher time alone

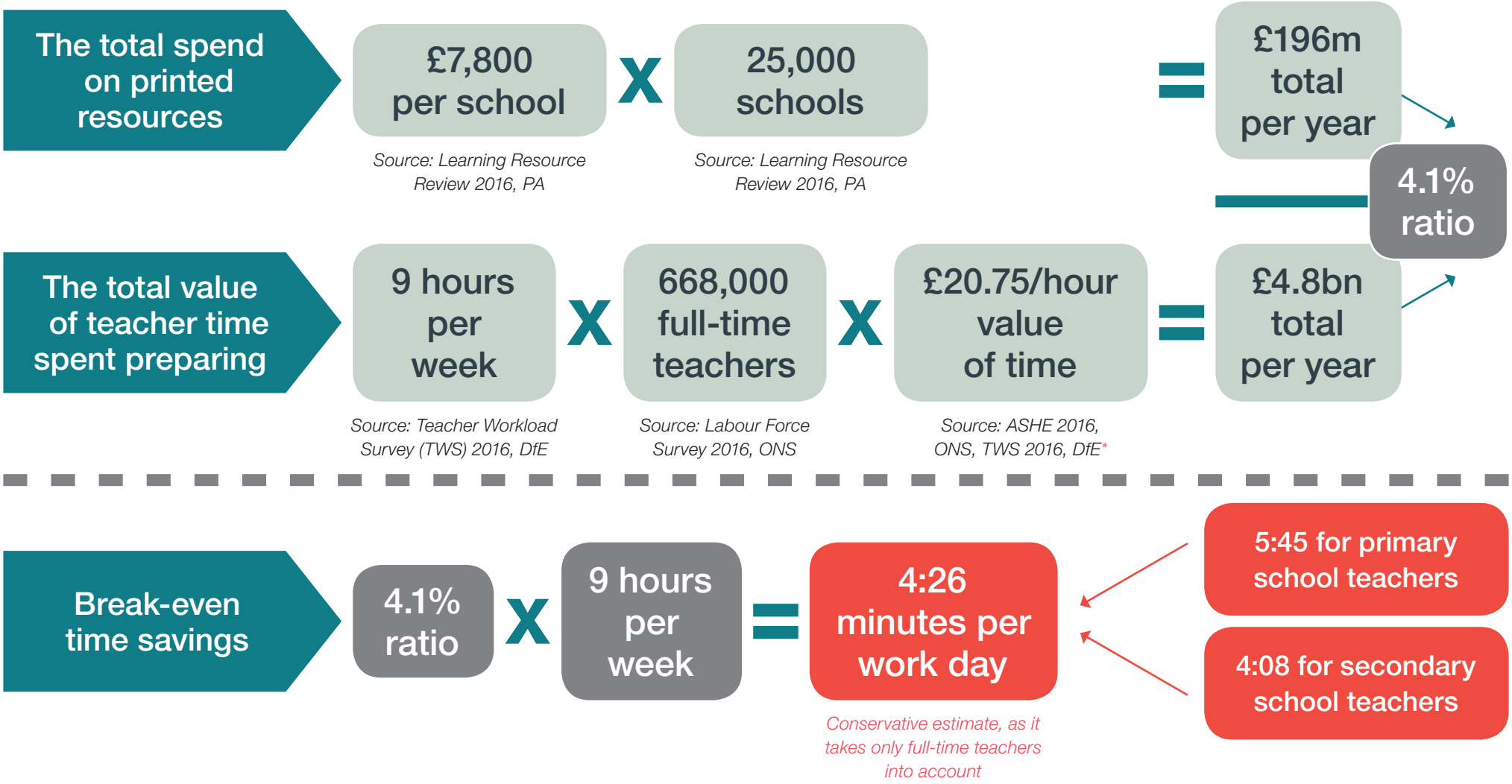
This is a conservative calculation, based on data for full-time teachers only. In reality, textbooks are likely to save time for part-time teachers as well.

There is evidence suggesting that textbooks do indeed save a substantial amount of time. Some survey data (with limitations) implies a saving of 18 minutes a day or more – suggesting textbooks pay for themselves four times over.

Note that this does not necessarily represent financial savings, but rather the value of reallocating teacher time to more productive tasks.

Naturally, these are time savings alone – any other benefits (for instance, in teaching quality) would be additional.

The ‘break-even’ time-saving is based on a time-value approach, using the best available sources.

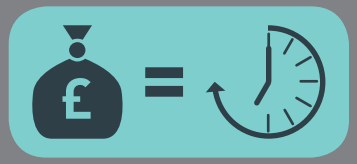


* ASHE is the Annual Survey of Households and Earnings, which provides the annual earnings for teachers. This is then divided by 39 working weeks to arrive at a weekly wage. For an hourly wage, this is divided by 57 hours per week, the working time reported in the Teacher Workload Survey. Finally, the net hourly wage of £16.39 is scaled up to include non-wage employer costs such as pension contributions, in line with the standard government approach in calculating time value (or ‘opportunity cost’) as outlined in HM Treasury’s ‘Green Book’.

2 APPROACH AND RESULTS

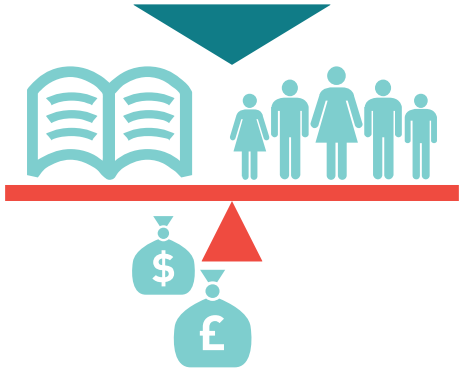
We use the value of teacher time to assess whether school spending on published material 'pays for itself' in terms of time saved.

In economics, salaries are often used as a financial measure of the 'value of time'



So if we knew how much time textbooks save and how much teachers' time is worth, we can quantify the contribution of textbooks

However, there is an evidence gap about the exact amount of time that textbooks save for teachers



In light of this, the best approach is to conduct a 'break-even' analysis, and answer the question: **"How much time would textbooks need to save to pay for themselves?"**

In other words, what would you have to believe to consider textbooks to have at least a 1:1 benefit-to-cost ratio?

If published resources save teachers' time, they can reduce their workload and/or reallocate time to more productive tasks

If published resources save teachers' time, this has an economic value. But that does not necessarily mean that schools would spend less on teachers than they otherwise would. If textbooks were taken away, schools may not employ more staff, but teachers may have to work harder or allocate time to less productive tasks.

Reduction in hours worked

Teachers may reduce overall workload, contributing to a better work-life balance.

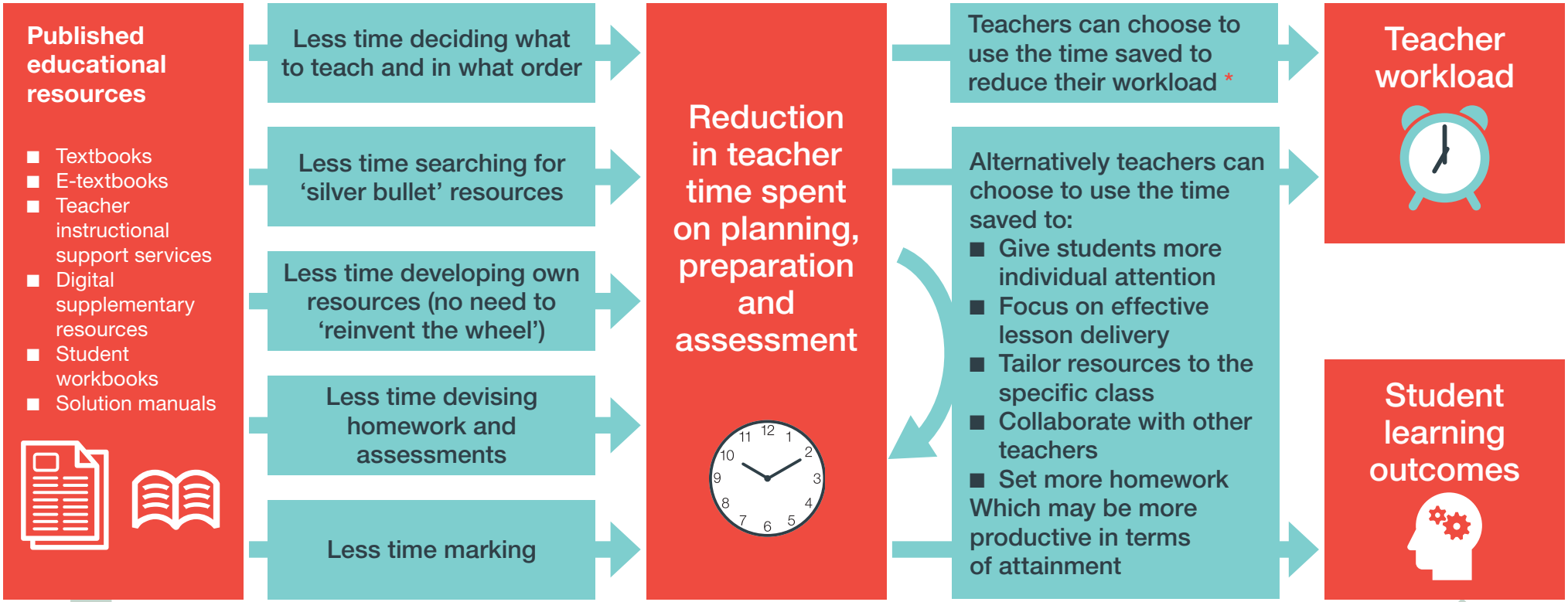
Time reallocated to more productive tasks

Teachers may also allocate time otherwise spent on planning to other tasks such as contact time with students, which could raise attainment levels.

Improvement in student outcome quality

Textbooks also directly increase student learning by improving lesson quality and helping students study outside the classroom. These are additional benefits not captured by teacher time savings.

… which can improve student outcomes through several channels.

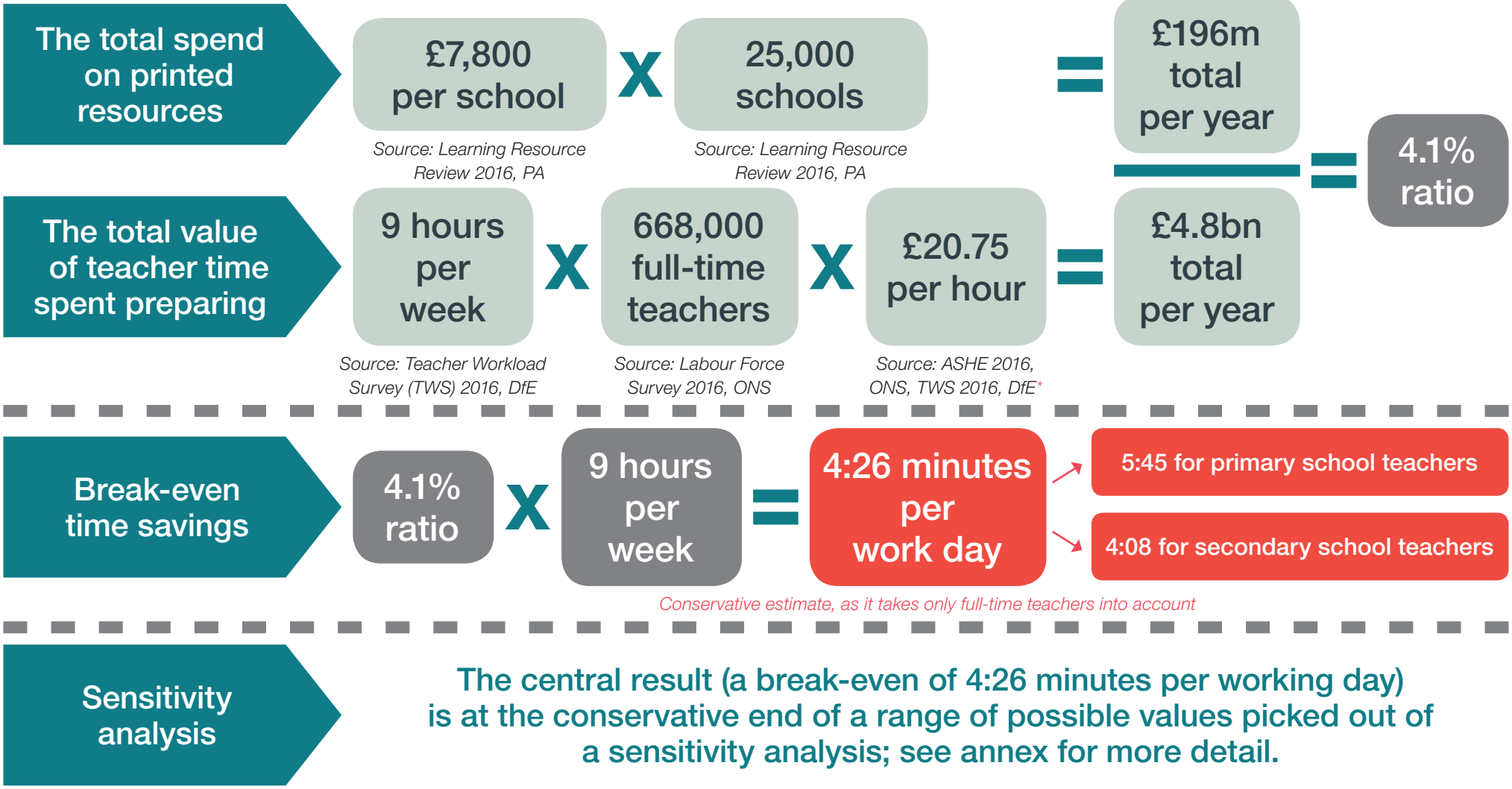


Textbooks also provide direct student benefits outside time savings for teachers

- Provide an 'ideas bank' that helps teachers to improve the quality of their lessons
- Provide clarity regarding key concepts and core knowledge, provide clear learning progressions, include a wide range of examples and applications and support learner reflection (Oakes, 2014)
- Ensures whole course is covered and consistency with curriculum aims
- Developed by experienced teachers/developers and refined over time to support highly effective pedagogic practices
- Provide clear reference material for students and facilitate study outside the classroom
- Encourage parents to help their children learn at home (Houtenville and Conway, 2007).

* See Jackson and Makarin (2016) for discussion of a similar model, without the teacher workload reduction aspect.

We estimate that the 'break-even' time-saving required is around four-and-a half minutes per working day per full-time teacher.



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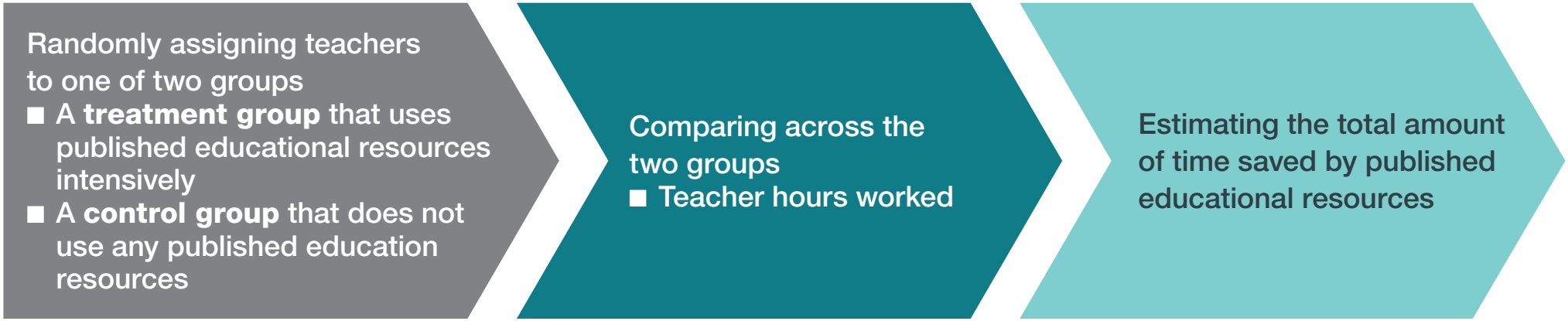
There is a gap in robust quantitative estimates of total time saved by published educational resources …

Ideal evidence on the total time saved by published educational resources would come from:



However, there are three difficulties that make such evidence hard to come by:

- It is rare for teachers to not use any published resources at all so hard to find a 'control group'
- There may be ethical barriers to run experiments of this sort, and there is limited scope for 'natural experiments' – for instance, textbook shortages are not common in the UK
- Academic researchers tend to focus on student test scores and rarely measure teacher time spend

Perhaps it is therefore unsurprising that we are not aware of any robust quantitative evidence on how the use of published resources affects teacher time, which would help identify whether a 4.1% ratio of time saved or reallocated is easily achieved. Our views are therefore driven by qualitative evidence to suggest that such a time-saving is highly plausible.

… there is some quantitative evidence that suggests published materials save much more than 4:26 minutes per day, on average …

The best data available as to the amount of time teachers save due to textbooks comes from a set of teacher surveys

The Textbook Challenge Survey

- Conducted by the Publishers Association in 2016
- Conducted among heads of subject and year, with responses from 687 primary and secondary school teachers
- Found that 95% of heads of subject and year believe textbooks do or could reduce the amount of time they spend on lesson planning.

The 'Textbooks Matter' Survey

- Conducted by HarperCollins in 2016, with responses from 595 teachers
- When asked about how much they think textbooks reduce their planning/preparation time:
  - 40% of respondents said they save no time, or skipped the question
  - 22% of respondents said they save 1–2 hours per week
  - 27% of respondents said they save 2–5 hours per week
  - 9% of respondents said they save 5–10 hours per week
  - 3% of respondents said they save 12+ hours per week
- Conservatively taking the lower end of each time band, a weighted average of time saved per week would be around 1.6 hours, or **18:16 minutes per working day**. This is much higher than the break-even figure of 4:26 minutes.
- However, there are some limitations to this estimate:
  - Respondents for this survey were recruited openly through a website, we do not know whether they are representative of the overall population of teachers; teachers who choose to respond to a survey titled 'Textbooks Matter' may well be those who value textbooks highly
  - In addition, there are two missing time bands (0–1 hours, 10–12 hours), which reduce the accuracy and robustness of these results.

… and there is also qualitative evidence that textbooks do reduce the time teachers spend on planning and preparation.

Academic research

- Trials of two English adaptations of Singapore maths textbooks (*'Maths No Problem'* and *'Inspire Maths'*) found that:
  - 98% of teachers said that the textbooks had been supportive to their planning
  - 74% said the textbooks had the potential to reduce their workload
  - 66% of teachers said textbooks had actually reduced their workload
  - One head teacher reported that the resources had "**vastly reduced**" the time teachers spend planning
- Evaluation of the use of an online resource (*'Espresso'*) in Lancaster in 2011 found that:
  - On average, teachers took 6.85 minutes to find, vet and assess how to use an *Espresso* resource, but 13.35 minutes for an internet-based resource (nearly twice as long)
- There is a general view among academics who study the teaching of English that textbooks are a core component of learning (see review in Nguyen, 2011).

Anecdotal evidence

High quality resources, including textbooks, can … reduce workload by teachers not having to "reinvent the wheel" (Independent Teacher Workload Review Group, 2016).

Given that novice teachers are considerably less effective, on average, than their more seasoned peers, common sense would suggest that asking them to construct their own curriculum in addition to honing the craft of teaching will only exacerbate their challenges (Steiner, 2017).

There is also evidence that published resources improve student learning outcomes …

A strong body of evidence shows that putting high-quality curricula (including published resources) in the hands of teachers can have significant positive impacts on student achievement (Agodini, Harris, Atkins-Burnett, Heaviside and Novak, 2010; Bhatt and Koedel, 2012; Bhatt, Koedel and Lehmann, 2013; Holden, 2016; Jackson and Makarin, 2016).

The evidence is of high quality

- Multiple research studies meeting the highest bar for methodological rigor find substantial learning impacts from the adoption of specific curricula. The impact on student learning can be profound (Steiner, 2017).

The improvement in student achievement is large

- Switching from business as usual to the best curricula can increase student scores from the 50th to 60th or even 70th percentile (Steiner, 2017)
- Using higher quality curricula increases student learning more than other, more well-known, interventions such as expanding preschool programs, giving merit pay to successful teachers and decreasing class sizes (Whitehurst, 2009; Chingos and Whitehurst, 2012).

This may underestimate the true benefit of published resources

- Many of these studies compare intensive use of published resources to "business as usual". But this may understate the benefits of textbooks if "business as usual" still involves some textbook use (Steiner, 2017).
- Most studies look at outcomes over only one or two years but textbooks can be used more many years consecutively so the benefits can accumulate over time (Steiner, 2017).

Example: Holden, 2016, *Buy the Book? Evidence on the Effect of Textbook Funding on School-Level Achievement*

- Study of a one-time $100 per student increase in school funding for textbooks in California – as required by a lawsuit settlement. Trial evidence suggests that textbooks were in very short supply before the funding increase
- Led to increased primary school test scores in reading and maths by 0.14 standard deviations.* This is equivalent to approximately four months' extra learning (Hill et al., 2008).

* Holden does not find statistically significant increases in secondary school test scores but suggests this is due to California having five times more primary schools than secondary schools – this makes it more difficult for the secondary school estimates to be captured statistically.

… which could partly be explained by teachers being able to allocate time more effectively to support learning.

- Our 'logic model' (see page 9) shows increases in test scores related to textbooks may or may not be due to textbooks freeing up teacher time. Increased test scores could also, for example, be consistent with students using the textbook to study more at home.
- But two academic studies show that **freeing up teacher time** and allowing teachers to reallocate the time to more productive areas is **a key part of the improvement in test scores.**

Jackson and Makarin (2016)

A randomised experiment giving maths teachers access to a library of online "off-the-shelf" lesson plans that cost $320 per teacher for the year

Key findings:

- Increased student maths achievement by 0.09 standard deviations or three months of learning
- Largest benefits for inexperienced teachers
- Teachers using the lessons most got their classes the highest test scores
- Consistent with off-the-shelf lessons freeing up teacher time to exert more effort in the classroom. The number of students agreeing with the statement that their maths teacher spends more one-on-one time was highest for students where teachers used off-the-shelf lessons
- A survey of teachers suggested off-the-shelf lessons encouraged teachers to set more homework, perhaps because less time was needed to design homework tasks.

Trials of textbooks in schools

The same trials of *'Maths No Problem'* and *'Inspire Maths'*

- Student achievement increased partly due to time saved
  - As already noted, resources "vastly reduced" planning time and 66% of teachers had reduced workload
  - Even when teachers said their workload was not reduced, this was because their focus changed – they spent less time searching for resources and more time thinking about delivery and children's learning.

> The textbook … has reduced workload significantly. This 'extra' time can be spent 'unpicking' the lesson carefully. At last the teachers' focus is on the most important thing (the maths being taught) rather than trying to put together a cohesive learning experience (school teacher, NCETM).

3 ANNEX

Sensitivity analysis for break-even calculation

School type	Full-time teachers only		All teachers, assuming 50% utilisation for part-time teachers		All teachers, taking part-time teacher time reporting at face value	
	Break-even ratio	Break-even minutes per day	Break-even ratio	Break-even minutes per day	Break-even ratio	Break-even minutes per day
Primary	4.4%	5:45	3.5%	4:55	3.4%	4:43
Secondary	3.9%	4:08	3.4%	3:26	3.1%	3:19
Total	4.1%	4:26	3.5%	3:40	3.3%	3:30

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